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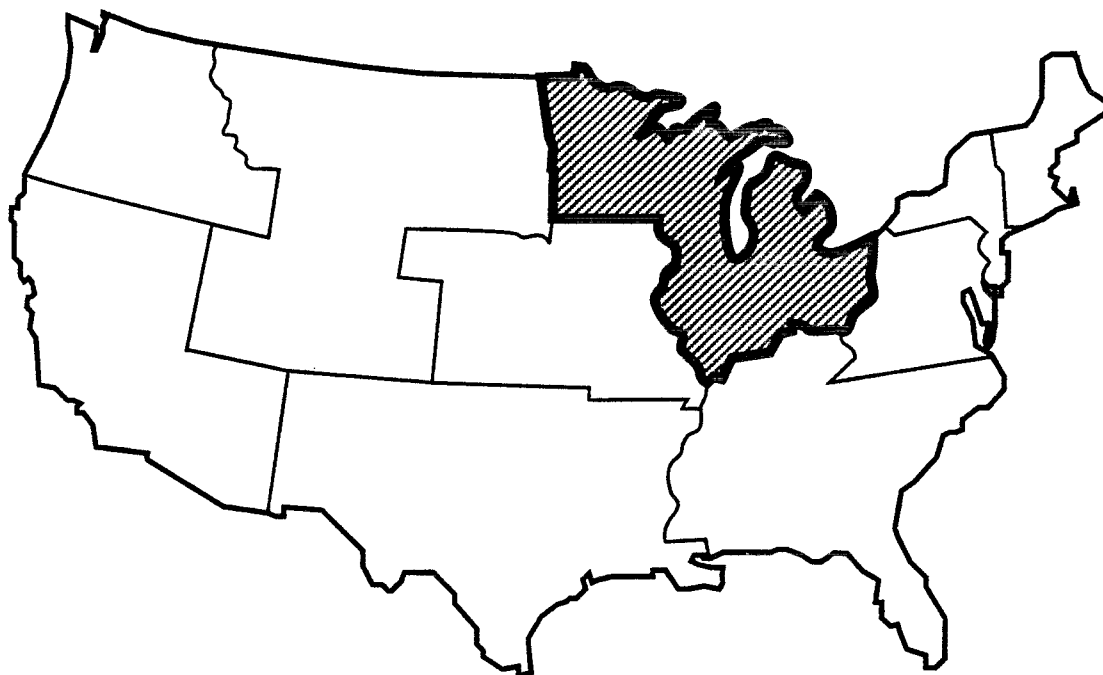
Remedial Activities at Uncontrolled Hazardous Waste Sites in Region V

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EPA

United States Environmental
Protection Agency



CH2M HILL

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**FINAL
Feasibility Study
Operable Unit No. 3
RSR Corporation Superfund Site**

**ARCS Contract No. 68-W8-0040
EPA Work Assignment No. 81-6P6R
CH2M HILL Master Project No. 111432**

February 1996

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Acronyms

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AOC	Administrative Order on Consent
ARARs	applicable or relevant and appropriate requirements
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
COCs	Contaminants of Concern
COPCs	Contaminants of Potential Concern
CWP	Conceptual Work Plan
DHA	Dallas Housing Authority
EE/CA	Engineering Evaluation/Cost Analysis
EPA	U.S. Environmental Protection Agency
ERA	Ecological Risk Assessment
FML	flexible membrane liner
FS	Feasibility Study
FTC	Federal Trade Commission
GRAs	general response actions
HHRA	Human Health Risk Assessment
HI	hazard index
IEUBK	Integrated Exposure Uptake Biokinetic Model
LOAEL	lowest observed adverse effect levels
MCLs	maximum contaminant levels
MHMR	Dallas County Mental Health/Mental Retardation
NCP	National Contingency Plan
NOAEL	no observed adverse effect levels
NPL	National Priorities List
O&M	operation and maintenance cost
OU	operable unit
POTW	publicly owned treatment works
ppm	parts per million
PQL	practical quantitation limit
RACER	Remedial Action Cost Engineering and Requirements System
RAOs	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RME	Reasonable Maximum Exposure
ROD	Record of Decision
RSR Site	RSR Corporation Superfund Site
SACM	Superfund Accelerated Cleanup Model
SARA	Superfund Amendment and Reauthorization Act of 1986
SVOCs	semi-volatile organic compounds

TAL	target analyte list
TBC	To Be Considered
TCL	target compound list
TCLP	toxicity characteristic leaching procedure
TDS	total dissolved solids
TSS	total suspended solids
TMV	toxicity, mobility, or volume
TWC	Texas Water Commission
TNRCC	Texas Natural Resource Conservation Commission
TOC	total organic compounds
UCL	upper confidence limit
VOCs	volatile organic compounds
XRF	X-ray Fluorescence

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Section 1
Introduction

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Section 1

Introduction

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This Feasibility Study (FS) has been developed to evaluate remedial methods available to the U.S. Environmental Protection Agency (EPA) for reducing contaminant concentrations in soils within Operable Unit No. 3 (OU No. 3) at the RSR Corporation Superfund Site (RSR Site). This report presents the results of the FS conducted pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act, as amended by the Superfund Amendments and Reauthorization Act of 1986 (CERCLA), 42 U.S.C. §9601 *et. seq.* and the National Oil and Hazardous Substance Pollution Contingency Plan (NCP), 40 C.F.R. Part 300. Contamination within this area, attributable to the RSR Corporation, resulted from slag and battery chip disposal on the land surface and within several local municipal landfills. The basis of this FS is the Remedial Investigation (RI) that was performed on OU No. 3 during the summer of 1995 and the Baseline Risk Assessment. This FS establishes remedial objectives for the cleanup actions and evaluates specific alternatives for meeting those objectives. The FS follows the *EPA Guidance on presumptive Remedy for CERCLA Municipal Landfill Sites* (EPA, 1993a). The RI and Baseline Risk Assessment have been prepared as separate documents (EPA, 1996a; EPA, 1996b).

The RSR Site is located in a primarily residential/light industrial section of west Dallas, Texas, just south of the Trinity River. Contamination of the RSR Site originated from the operation of a secondary lead smelter facility located near the center of the RSR Site. Disposal of blast furnace slag and battery casing chips on the smelter facility properties and in the surrounding areas throughout the years of the smelter's operation also contributed to the RSR Site's contamination. Available data originally indicated that the principal contaminants of concern (COCs) were lead, arsenic, and cadmium, which are all listed as hazardous substances as defined by Section 101(4) of the CERCLA 42 U.S.C., §9601 (14), and 40 C.F.R. §302.4. As a result of potential threats to human health and the environment from contaminated media, the RSR Site was included on the Superfund National Priorities List (NPL) of uncontrolled hazardous waste sites on September 29, 1995 (60 Federal Register 50435) (EPA, 1995a). The RSR Site is currently

divided into five (5) OUs. These OUs are also discussed later in this section. The focus of this FS is OU No. 3. The remaining OUs are covered in other FSs.

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1.1 Purpose and Organization of Report

The information in this report is organized into four (4) sections. **Section 1** provides the history of the RSR Site, as well as summaries of the COCs, the baseline risk assessment, and applicable or relevant and appropriate requirements (ARARs). **Section 2** establishes the objectives for this remedial action and the general response actions (GRAs) available for use at the RSR Site using the presumptive remedy approach. **Section 3** assembles the response options presented in **Section 2** into alternatives for remedial response and describes the alternatives. Finally, **Section 4** provides a detailed analysis of the alternatives to allow determination of the most appropriate alternative for remediation within OU No. 3 at the RSR Site.

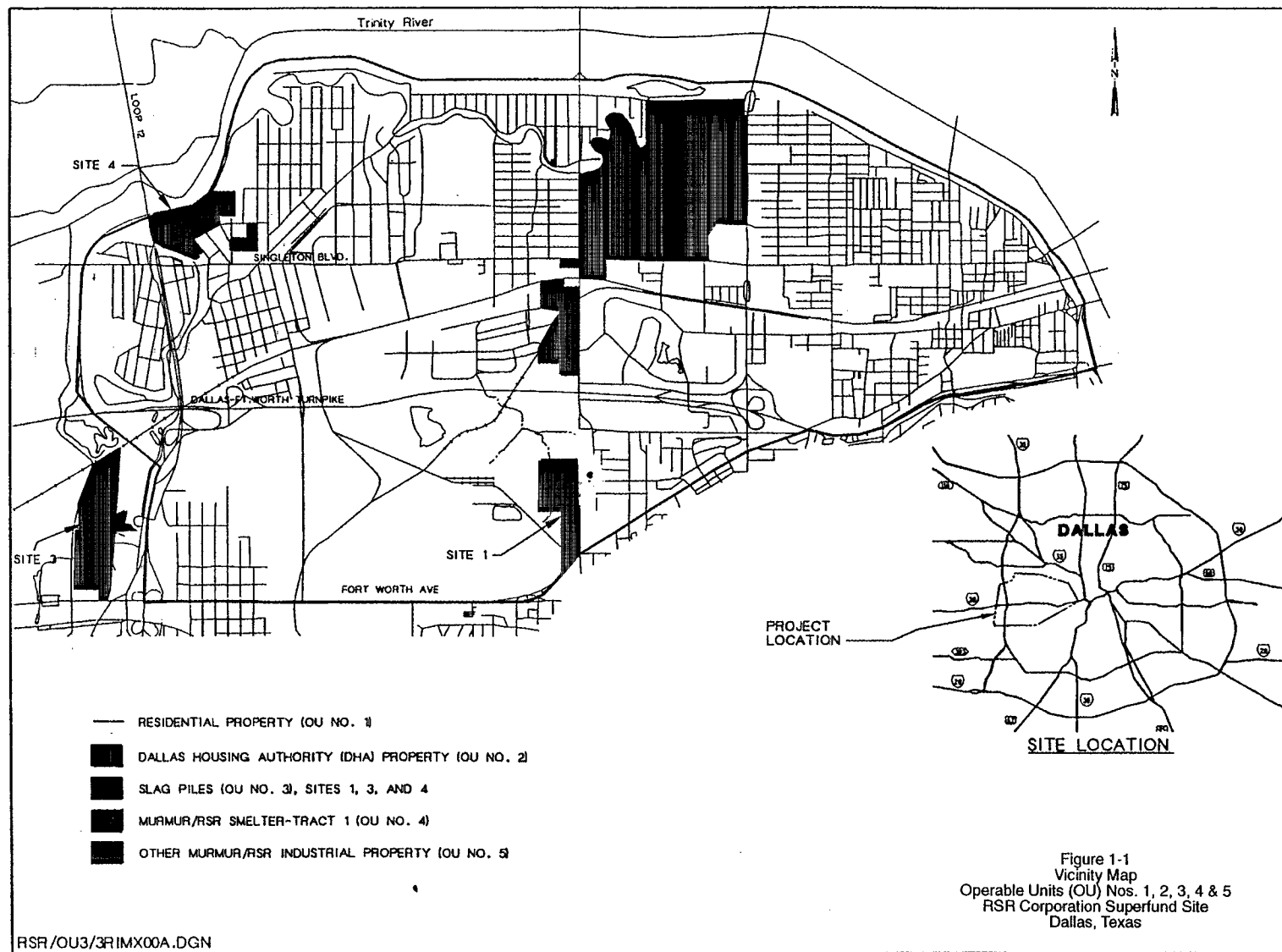
1.2 Background Information

1.2.1 Site Description

The RSR Site is located in west Dallas, just south and west of the Trinity River, and is characterized by residential, commercial, and light industrial areas. **Figure 1-1** illustrates the area comprising the RSR Site. The RSR Site is currently divided into five (5) OUs, as follows (see **Figure 1-1**):

- OU No. 1 – Residential Property
- OU No. 2 – Dallas Housing Authority (DHA) Property
- OU No. 3 – Landfill/Slag Piles
- OU No. 4 – Murmur/RSR Smelter Tract 1
- OU No. 5 – Other Murmur/RSR Industrial Property

OU No. 1 consists primarily of single- and multi-family housing and some commercial and retail establishments, as well as schools, churches, parks, recreation facilities, and



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daycare centers. The remedial investigation for OU No. 1 included an in-home sampling effort conducted by EPA, the City of Dallas, and the Agency for Toxic Substances and Disease Registry (ATSDR). This investigation included household blood-lead testing of young children between the ages of 6 months and 6 years. Concurrently, EPA conducted environmental media sampling (e.g., soil, dust, paint, and tap water) in these same households. The RI Report for OU No. 1, which describes results from the in-home investigation and summarizes previous investigations completed within OU No. 1, was issued for public notice and comment on November 18, 1994 (EPA, 1994a). On that date, EPA also issued a Proposed Plan for OU No. 1 that recommended no further remedial action was necessary. On May 9, 1995, EPA signed the Record of Decision (ROD) for OU No. 1 that stated no further action was necessary for protection of human health and the environment.

OU No. 2 includes single- and multi-family public housing units under jurisdiction of the DHA. DHA has entered into an Administrative Order on Consent (AOC) with EPA to perform demolition and removal actions and an RI/FS for OU No. 2. On November 18, 1994, EPA issued the RI Report and Proposed Plan recommendations that determined no further remedial actions will be necessary upon the completion and EPA's approval of the removal/demolition activities. The removal/demolition activities performed by DHA were completed and approved by EPA in March 1995. On May 9, 1995, EPA signed the ROD for OU No. 2 that stated no further action was necessary for protection of human health and the environment.

OU No. 3, the focus of this FS, consists of three (3) separate sites where slag and battery casing chips have been disposed. These sites were identified by the Texas Water Commission (TWC) (currently known as the Texas Natural Resource Conservation Commission [TNRCC]) and designated as Sites 1, 3, and 4. Site 1, referred to as the Westmoreland Road Property, consists of approximately 50 acres of land located on the west side of the 1000 block of North Westmoreland Road, just north of Fort Worth Avenue (Figure 1-2). Site 2 is an area located within OU No. 5 property. Because of its location, Site 2 is included with OU No. 5 instead of other disposal sites comprising OU No. 3. Site 3, referred to as the Walton Walker Property, located west of Loop 12 and north of Davis Street, contains approximately 130 acres of land that were formerly three (3) City of Dallas landfills (Figure 1-3). The third property included in OU No. 3 is referred to as Site 4, the Claibourne Boulevard Property, and is located at the terminus of

what was once Claibourne Boulevard (**Figure 1-4**). This property encompasses approximately 60 acres of privately-owned lots situated above four (4) former City of Dallas landfills.

OU No. 4 is the former secondary lead smelter property located at 2820 North Westmoreland Road, south of Singleton Boulevard and east of North Westmoreland Road at their intersection. The smelter facilities at OU No. 4 once included furnaces, refinery kettles, casting equipment, a batch house, warehouses, repair shops, a laboratory, offices, lunch/locker rooms, storage facilities, docks, mobile equipment, baghouses, water treatment equipment, and a truck and trailer fleet. Currently, all buildings have been abandoned and are in disrepair. Several buildings are unstable, as evidenced by collapsing roofs and other structural deficiencies. Several pieces of equipment and piping have been removed from the smelter building and surrounding areas. This OU is covered by concrete pavement and building structures (except in the northeast corner) and is fenced.

OU No. 5 consists of the Former Battery Wrecking Facility building and all other industrial tracts of land associated with the former smelter; it is located to the south of Singleton Boulevard and west of North Westmoreland Road. Currently, the Murmur Corporation operates lead fabricating and manufacturing facilities (formerly referred to as Tract II), which have been excluded from the RI/FS. The RI/FS OU No. 5 has been completed.

1.2.2 Site History

From 1934 until 1971, a lead smelting facility located near the center of the RSR Site was operated by Murph Metals, Inc. or its predecessors. In 1971, the RSR Corporation acquired the lead smelting operation and continued to operate the facilities under the name Murph Metals. The facility continued to operate under RSR Murph until March 1984 when a Federal Trade Commission (FTC) divestiture order resulted in the acquisition of the facility in May 1984 by the current owner, the Murmur Corporation. The City of Dallas declined to renew the facility's operating permit. This decision was based on the facility's historical operational practices and changes in the City's zoning ordinance restrictions. As a result, the smelter closed in 1984. The Murmur Corporation facility currently consists of the smelter facility and other associated properties, including the

Former Battery Wrecking Facility and a lead manufacturing and fabricating facility that produces lead shot and foil.

On May 10, 1993, EPA proposed to add the RSR Site to the NPL of Superfund sites. The RSR site received a hazard score of 50, exceeding the critical score of 28.5, and was consequently placed on the NPL on September 29, 1995. The score was based solely on the soil exposure pathway. At the time, the primary COCs were listed as lead, arsenic, and cadmium. Deposition from historical air emissions resulted in contamination of properties near the RSR Site. In addition, battery casing chips and slag were used as residential fill materials and disposed of in areas operated as local municipal landfills.

1.2.3 Description of OU No. 3 and Surrounding Areas

OU No. 3 includes three (3) separate sites located in the south-central and western portions of the RSR Site. **Figures 1-2, 1-3, and 1-4** show general site features of Sites 1, 3, and 4. As described in the Conceptual Work Plan (CWP) for the RI, these sites were originally identified as containing slag and battery casing chips thought to be associated with smelter operations. Because remediation for Site 2, located within the boundaries of OU No. 5, is being addressed by EPA under the remedial activities conducted for OU No. 5 (**EPA, 1996c**), the OU No. 3 FS focuses on Sites 1, 3, and 4.

Existing data for OU No. 3 indicate that heavy metals derived from waste generated through the secondary lead smelting and refining process (e.g., lead, arsenic, cadmium, and related compounds) are contaminants of potential concern (COPCs). An additional concern related to Sites 3 and 4 is the potential presence of contaminants resulting from municipal landfill activities unrelated to the smelter. Both solid and liquid hazardous waste (e.g., batteries, spent oil, and paint), may have been co-disposed in the municipal landfills by households, small-quantity generators, and by other entities prior to the implementation of federal hazardous waste regulations in the early 1980s.

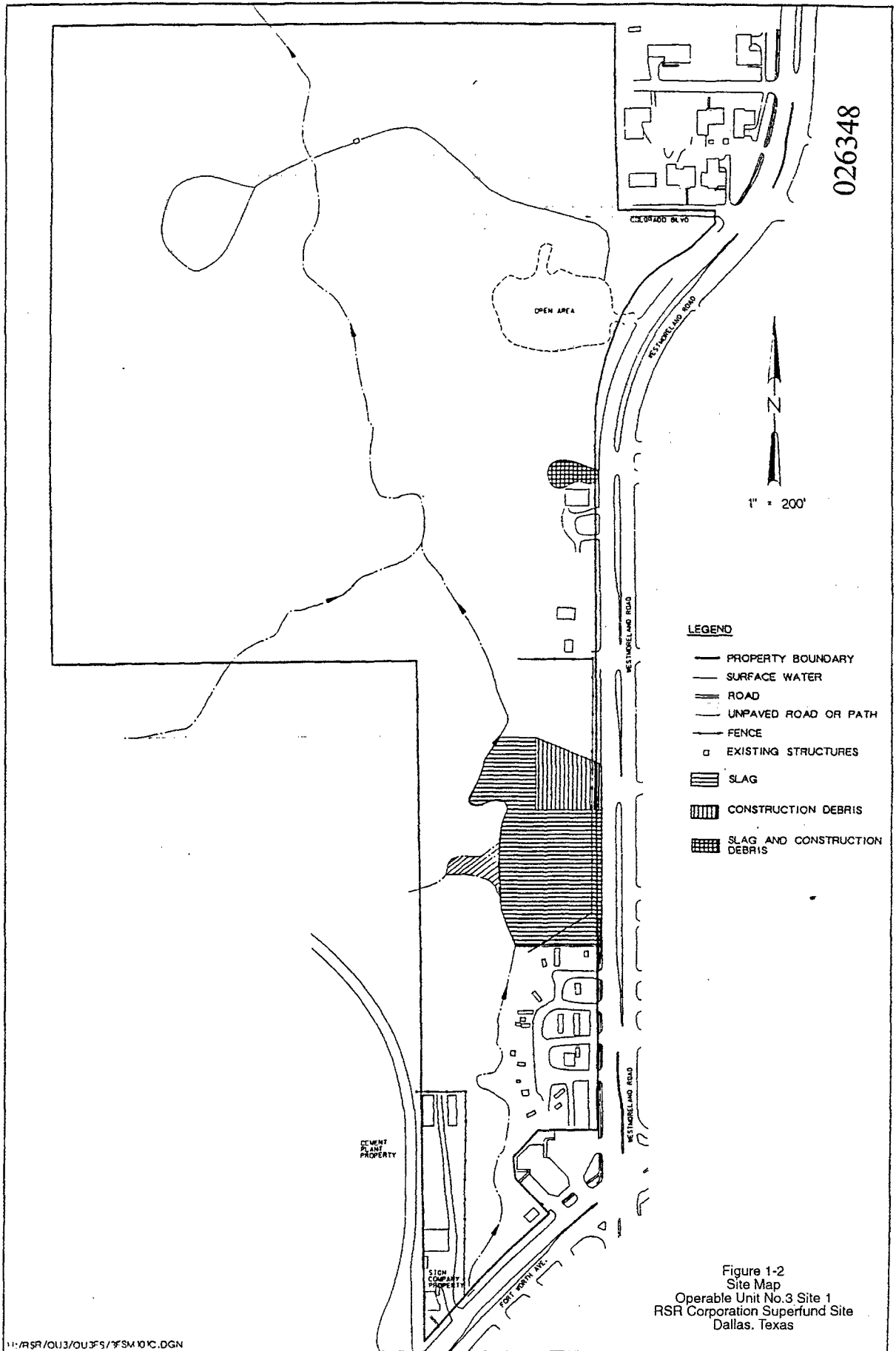
The following sections describe each site in more detail.

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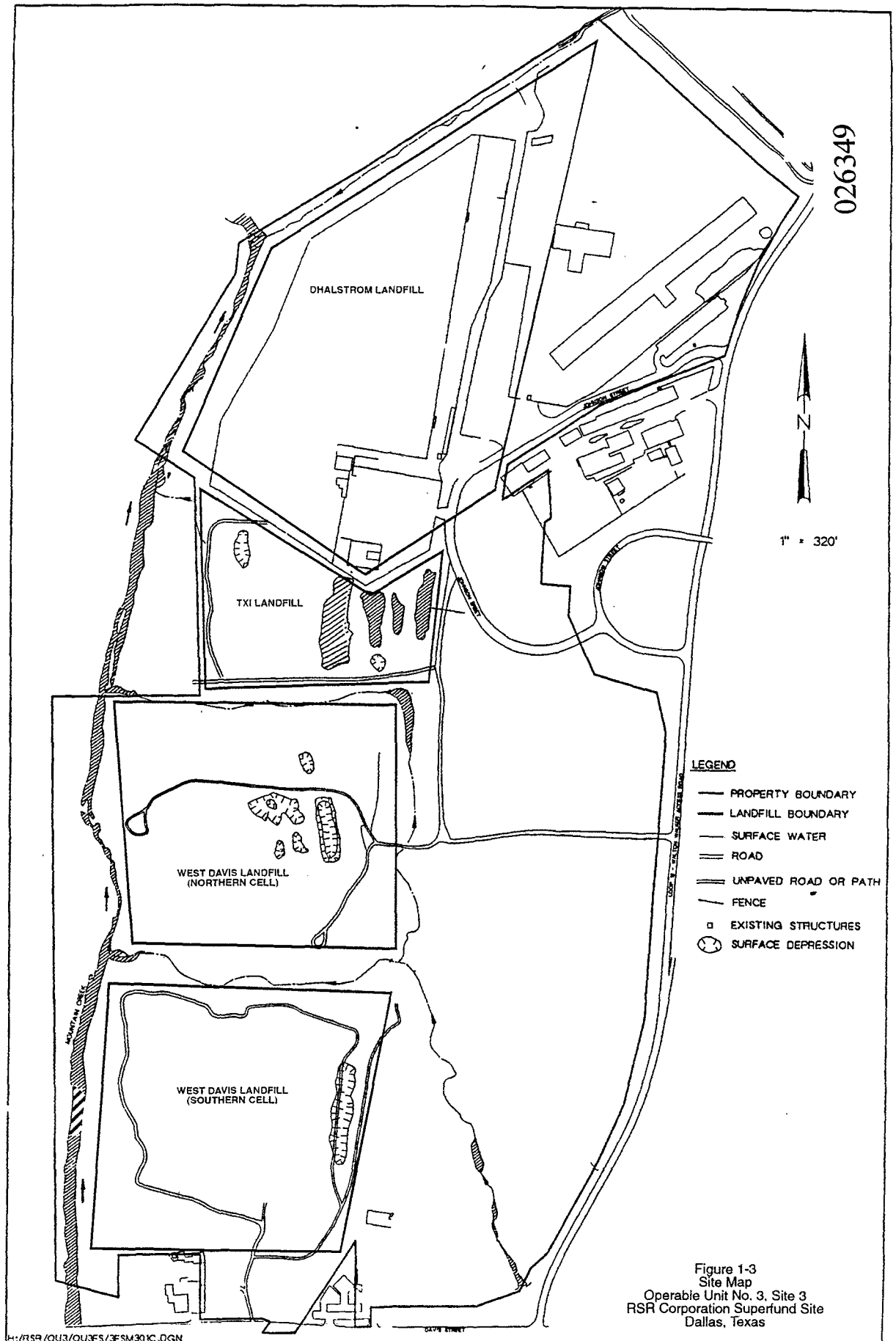


LEGEND

- PROPERTY BOUNDARY
- SURFACE WATER
- ROAD
- UNPAVED ROAD OR PATH
- FENCE
- EXISTING STRUCTURES
- ▨ SLAG
- ▩ CONSTRUCTION DEBRIS
- ▧ SLAG AND CONSTRUCTION DEBRIS



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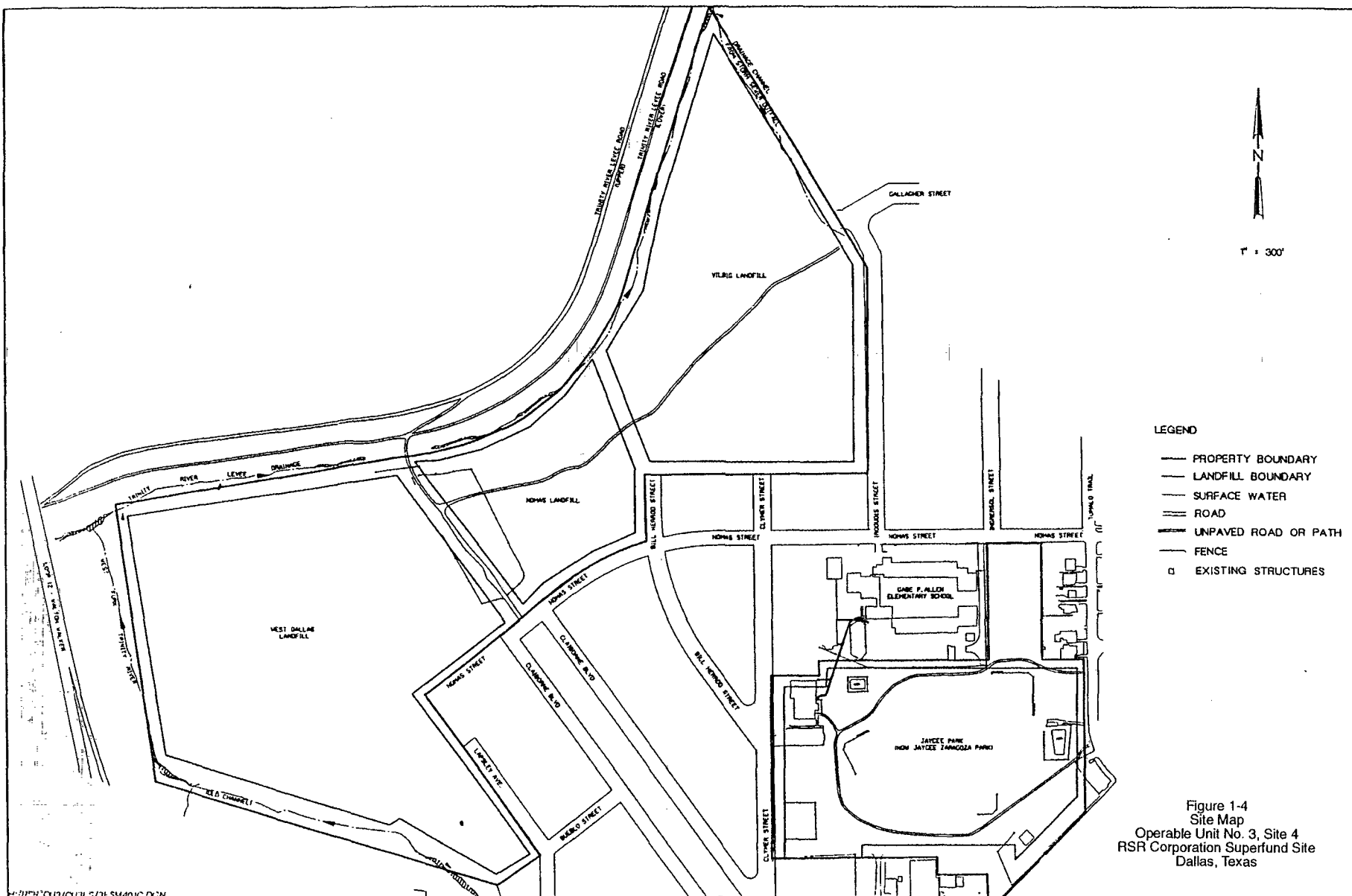


Figure 1-4
Site Map
Operable Unit No. 3, Site 4
RSR Corporation Superfund Site
Dallas, Texas

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1.2.3.1 Site 1

Site 1, also known as the Westmoreland Road Property, is located on the west side of the 1000 block of Westmoreland Road, just north of Fort Worth Avenue in the south-central portion of the RSR Site. Site 1 encompasses approximately 50 acres and is bounded on the northeast by the western boundary of the A.W. Britain subdivision, on the southeast by Westmoreland Road, on the south by Fort Worth Avenue, on the west by property formerly used as a cement plant, and on the north by the southern boundary of property owned by Dallas County Mental Health/Mental Retardation (MHMR) Center (DPRA, 1993). **Figure 1-2** illustrates the approximate boundary and general features of Site 1.

Site 1 is located within the outcrop area of the Austin Chalk formation (**University of Texas at Austin, 1988**). The topography of Site 1 is characterized by the steep banks of a creek that flows from south to north through the entire site (**EPA, 1995b**). This creek is intermittent and is incised into the Austin Chalk, which outcrops along the bank. Several structures present on Site 1 include mobile homes in a trailer park near the southeast corner, a business located at the southwest corner, and a house and two sheds along Westmoreland Road to the east. Portions of the eastern side of Site 1 (between Westmoreland Road and the creek bank just north of the trailer park) appear to have been used for surface dumping of slag, battery casing chips, and other material (used tires, appliances, and municipal debris) (**EPA, 1938-1992; EPA, 1995b**). The area where most of the slag piles are located is partially enclosed by a chain link fence. Several large piles of construction debris are located in the northern portion of the fenced area, just west of Westmoreland Road. Access to most of Site 1 is restricted by dense vegetation.

1.2.3.2 Site 3

This site, also known as the Walton Walker Property, is located northwest of the Loop 12- (Walton Walker Boulevard) Davis Street intersection, in the far-western portion of the RSR Site. Site 3 encompasses approximately 130 acres of privately owned property and is bounded, in general, on the east by a utility line right-of-way, on the north by a railroad right-of-way, on the west by Mountain Creek, and on the south by Davis Street (**DPRA, 1993**). **Figure 1-3** illustrates the approximate boundary and general features associated with Site 3. Historical aerial photographs of Site 3 (**EPA, 1938-1992**) indicate that the

area currently called Site 3 was apparently within the floodplain of Mountain Creek prior to the creek's diversion to its present location (which appears to have been completed by 1950).

According to the CWP developed for the investigation, the property owners leased the land to the City of Dallas, which operated three (3) sanitary landfills at this location from the mid-1960s through the late 1970s and early 1980s (**EPA, 1993**). The Dahlstrom Landfill is a 33.3-acre tract of land at the northern end of Site 3 that was in operation from 1976 to 1982. This property is now the site of an auto salvage yard. Located on the south of Dahlstrom Landfill, the 23.6-acre TXI Landfill was in operation from 1973 to 1976. The 42.4-acre West Davis Landfill, which comprises the southern half of Site 3, was in operation from 1964 to 1973 (**DPRA, 1993; EPA, 1993**). Since the landfills have closed, tracts of the TXI and West Davis Landfills have not been developed for other uses.

During reconnaissance activities at Site 3, the ground surfaces of the three (3) landfills were approximately 20 feet above Mountain Creek, with evidence of former trenching and filling activity and fairly dense vegetation (**EPA, 1938-1992; EPA, 1995b**). Three (3) landfill cells (the two [2] West Davis cells and the TXI landfill cell) are separated by two (2) diversion channels, which flow west, in parallel, across Site 3 and drain into Mountain Creek. These channels are fed by upstream surface water and stormwater runoff from a sewer outfall located at the intersection of Loop 12 and Davis Street and surface water runoff from the landfill areas. Landfill material is visible along several of the stream banks and slag and battery casing chips were observed on the ground surface of the TXI and West Dallas Landfills (**EPA, 1995b**).

1.2.3.3 Site 4

Site 4, also known as the Claibourne Boulevard Property, is located at the northern terminus of Claibourne Boulevard and in the northwest corner of the RSR Site. Encompassing approximately 60 acres, Site 4 is bounded on the west and southwest by the Old Channel of the West Fork of the Trinity River, on the north by the Trinity River Levee, on the east by a small drainage channel and Iroquois Street, and on the southeast by Nomas Street (**DPRA, 1993**). Site 4 also includes a nearby property, Jaycee-Zaragoza Park (Jaycee Park), that is bounded approximately by Singleton Boulevard to the south, Clymer Street to the west, Gabe P. Allen Elementary School to the North, and Tumalo

Trail and Bernal Street to the east (DPRA, 1993). **Figure 1-4** illustrates the approximate boundaries and general features of Site 4.

Historical aerial photographs of Site 4 indicate that prior to construction of the Trinity River Levee, what is now known as Site 4 appears to have been within the floodplain of the Trinity River (EPA, 1938-1992). The aerial photographs from 1938 and 1942 show what appears to be sand and gravel mining on the property. Most of the area that is now Site 4 appeared to be used for sand and gravel mining through approximately 1956.

According to the CWP developed for this investigation, the City of Dallas leased this land during the 1950s and operated four (4) sanitary landfills until the early to mid-1970s (EPA, 1993). The Vilbig Landfill is a 24.0-acre tract of land on the northeast corner of Site 4 (**Figure 1-4**). Landfilling operations apparently were conducted on this property at various intervals between 1956 and 1970. The 3.2-acre Nomas Landfill, located at the northern end of Claibourne Boulevard and southwest of the Vilbig Landfill, was in operation from 1967 to the mid-1970s. The West Dallas Landfill is a 28.4-acre tract comprising the western half of Site 4. Operation of this landfill began some time after 1956 and ceased in 1975. In the late 1950s, the Dallas Park Board purchased the property that is now Jaycee Park (located south of the Gabe P. Allen Elementary School in **Figure 1-4**) and received approval from the City to landfill the area to bring it to grade (EPA, 1993). The land appears eroded in pre-1960 aerial photographs (EPA, 1938-1992). Although few City records were found that document subsequent activities on Site 4, historical aerial photographs indicate that by 1964, a park, baseball diamond, and recreation center had been built at this location (EPA, 1938-1992).

After landfilling activities were completed and the larger portion of land comprising Site 4 was released back to the property owners, it was subdivided. Some of the Nomas lots were sold, but the area was never developed (DPRA, 1993). During site reconnaissance activities conducted for the OU No. 3 RI, it was noted that the existing features of Site 4 are indicative of its former land use (EPA, 1995b). The area is relatively flat with some trenches visible on the surface that in the central and western portions of Site 4 are 10 to 20 feet above the Old Channel of the West Fork of the Trinity River. Surface dumping (mostly municipal debris) was evident on the eastern part of Site 4, and slag and battery casing chips were observed on the ground surface of the Nomas and West Dallas Landfills, particularly near the north end of Claibourne Boulevard where, until recently,

dumping of municipal and construction debris also appears to have occurred (EPA, 1995b).

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1.3 Nature and Extent of Contamination

The following sections present a brief summary of the information contained in the RI Report for OU No. 3 (EPA, 1996a). The OU No. 3 field investigation included sampling soils, groundwater, landfill gas, surface water and sediments, storm sewers, drainageways, and pipelines for each of the sites. Field investigation results are presented in this section by medium and site. The inorganic results focus primarily on arsenic and lead, which are the analytes that contribute the most significant risk to the sites (EPA, 1996b).

1.3.1 Site 1

The RI investigations at Site 1 included collections of samples from stormwater runoff, surface water, sediment (in both surface water and a storm sewer structure), surface and subsurface soil, and groundwater. All samples were analyzed for target analyte list (TAL) inorganics, and a select number were also analyzed for target compound list (TCL) organics and/or toxicity characteristic leaching procedure (TCLP) inorganics and organics. Soil samples, from both surface and subsurface locations, were field-screened using X-ray Fluorescence (XRF) analysis with a subset submitted to a laboratory for the aforementioned analyses.

Site 1 is characterized by steep terrain and heavy vegetation. The terrain is dictated by creek cuts through the Austin Chalk formation, with more resistant Austin Chalk remaining in several areas. Surface deposition of slag, battery chips, and other debris is visible through most of the partially fenced area east of the creek (in the south-central to eastern portion of Site 1 [Area 1A]). This area is flat near Westmoreland Road, and drops at a steep gradient to the creek elevation toward the center of the Site. Dumping apparently occurred throughout the flat area and on the creek bank. The flat open area to the north also demonstrates various debris scattered on the surface.

1.3.1.1 Stormwater and Sediment

Stormwater samples collected from two (2) storm sewer locations on Site 1 exhibited elevated levels of some inorganic constituents. The highest concentration of lead (410 $\mu\text{g/L}$), as well as the highest frequency of occurrence of both total and dissolved inorganics, was demonstrated by the stormwater sample collected from an inlet where stormwater runoff from Westmoreland Road enters Site 1. The second sample, was collected from a concrete drainage within the fenced area of Site 1, in which large pieces of slag were observed, exhibited lead and arsenic at concentrations of 32.7 $\mu\text{g/L}$ and 61.1 $\mu\text{g/L}$, respectively. Only isolated organic compounds were detected, at low concentrations.

The analytical results for the sediment sample collected from the concrete drainage channel described above were consistent with those of the stormwater sample collected from the same location, although the sediment sample demonstrated a higher lead concentration (523Jv mg/kg). Arsenic was detected in this sample at 17.6 $\mu\text{g/L}$. Only a few organic compounds were detected, at low concentrations.

1.3.1.2 Surface Water and Sediment

Surface water was sampled at eleven (11) locations along the Site 1 creek, from just downstream of the storm sewer outfall at Fort Worth Avenue to the northern portion of the Site, and including two (2) surface seep locations along the eastern creek bank within the fenced area, and the drainage from the cement plant property. Generally, the highest concentrations of total and dissolved inorganics (including total lead and total and dissolved arsenic) were exhibited by the samples collected from the seeps and from the creek where slag was visible on the ground surface along the eastern bank.

Concentrations of total lead and arsenic ranged from 18.5 $\mu\text{g/L}$ to 318 $\mu\text{g/L}$ and 27J $\mu\text{g/L}$ to 187 $\mu\text{g/L}$, respectively. Lead concentrations generally decreased with distance downstream, and were at non-detectable levels downstream of the confluence of the cement plant drainage and the Site 1 creek. In addition to being detected in surface seep samples, total arsenic was detected at concentrations up to 37 $\mu\text{g/L}$ in surface water samples collected from the cement plant drainage and the Site 1 creek downstream of this drainage. Antimony was detected in these same samples at concentrations up to 13 $\mu\text{g/L}$.

Only a few organic compounds were detected in the Site 1 surface water samples, at low concentrations.

The sediment samples collected from the same eleven (11) locations generally demonstrated higher concentrations of inorganics than the associated surface water samples. Lead was detected in nine (9) samples at concentrations ranging from 16Jv mg/kg to 3,940Jv mg/kg, and arsenic was detected in ten (10) samples at concentrations ranging from 7.1J mg/kg to 224 mg/kg. The highest concentrations of lead and arsenic were exhibited by samples collected from locations at and near the seeps on the eastern bank of the creek. Several organic constituents, including chrysene (13J mg/kg) and Aroclor-1260 (0.029J mg/kg), were detected at relatively low concentrations, primarily at the seep locations.

1.3.1.3 Surface Soil, Soil Vapor, and Subsurface Soil

Lead and arsenic were detected in all twenty-nine (29) surface soil samples collected for laboratory TAL inorganics analysis, at concentrations ranging from 1 mg/kg to 105,000 mg/kg and from 10 mg/kg to 7,980 mg/kg, respectively. Cadmium was detected in seventeen (17) samples at concentrations between 0.5 mg/kg and 637 mg/kg. The highest concentrations of most TAL inorganics were detected in samples collected from locations where slag is present over much of the nearby ground surface. With a few exceptions, the concentrations of these constituents in samples collected from outside slag areas were lower by an order of magnitude or more. One (1) soil sample submitted for TCLP analysis demonstrated concentrations of lead (364 µg/L) and cadmium (2.36 µg/L) above their corresponding toxicity characteristic levels for hazardous waste of 5 µg/L and 1 µg/L, respectively (40 C.F.R. § 261.24).

Of the four (4) soil vapor samples collected during the direct push subtask of the soil investigation on Site 1, methane was detected in two (2) samples at concentrations of 16.9 ppm (6 feet bgs) and 29.8 ppm (2 feet bgs). These results did not affect subsequent subsurface drilling activities on Site 1.

Five (5) subsurface soil samples were collected from soil borings located in the southern portion of Site 1 only due to the shallow depth to bedrock over much of this site. Lead, arsenic, and cadmium concentrations exhibited by the three (3) samples collected from 0

to 2 feet bgs were as high as 6,540J mg/kg, 309J mg/kg, and 17.7 mg/kg, but only as high as 26.1 mg/kg, 13.7 mg/kg, and 0.31 mg/kg in the two (2) samples collected from depths of 11 and 22 feet bgs.

1.3.1.4 Groundwater

Groundwater was encountered in weathered Austin Chalk at only two (2) subsurface locations within Site 1. Lead was detected at less than 6 $\mu\text{g/L}$, and arsenic at less than 4 $\mu\text{g/L}$, in groundwater samples collected from monitoring wells at both locations.

1.3.2 Site 3

The RI investigations at Site 3 included collection of samples of surface water, sediment, surface and subsurface soil, and groundwater. All samples were analyzed for TAL inorganics, and a select number were also analyzed for TCL organics and/or TCLP inorganics and organics. Soil samples, from both surface and subsurface locations, were field-screened using XRF analysis, with a subset submitted to a laboratory for the aforementioned analyses.

Site 3 is the location of three (3) former City of Dallas municipal landfills. The site is characterized by flat to gently rolling terrain and fairly dense, opportunistic-type vegetation. The ground surface over the former landfills is slightly raised, and each landfill cell is bounded, in general, to the west, north, and south by surface water drainage channels. Battery casings and battery casing chips are present on the ground surface around the perimeter of the southernmost landfill cell (the southern cell of the West Davis Landfill), and battery casing chips are present over much of the ground surface in the eastern portion of the TXI Landfill, the southern portions of the northern and southern cells of the West Davis Landfill, and a small area east of the West Davis Landfill. Apparently uncontrolled surface dumping of construction and municipal debris over accessible portions of these landfill areas continues today. Access to some areas of Site 3 is restricted.

1.3.2.1 Stormwater and Sediment

Two (2) potential sampling locations (a storm sewer inlet at the intersection of Loop 12 and Davis Street, and a manhole for a sanitary sewer line that bisects the northern cell of the West Davis Landfill) were identified on Site 3, but could not be sampled due to lack of sample media and difficulty in accessing the structure, respectively.

1.3.2.2 Surface Water and Sediment

Twenty (20) surface water samples were collected from several drainages which bound the landfill cells on Site 3: Mountain Creek, which flows north along the west side of Site 3 from Davis Street; a drainage originating at the storm sewer outfall at the southeastern corner of Site 3, which flows northwest and splits into two branches that each flow west to Mountain Creek (separating the three (3) southernmost landfill cells); a drainage originating at a seep located on the west side of the TXI landfill which flows west into Mountain Creek; and a drainage originating offsite, northeast of Site 3, which flows west along the north side of the site into Mountain Creek. Surface water samples also were collected from three (3) ponds on the TXI Landfill, and five (5) surface seeps.

Total lead was detected in seventeen (17) Site 3 surface water samples at concentrations up to 1,700 $\mu\text{g/L}$. Total arsenic was detected in three (3) samples at concentrations up to 47.1 $\mu\text{g/L}$. Dissolved lead and arsenic also were detected in five (5) and thirteen (13) samples at concentrations up to 21.9 $\mu\text{g/L}$ and 185 $\mu\text{g/L}$, respectively (the few observed instances where a dissolved inorganic constituent concentration exceeds the associated total inorganic constituent concentration can be attributed to heterogeneity of the sample medium prior to being split for the different analyses). Several organic constituents were detected in these samples at relatively low concentrations. The highest concentrations of nearly all detected inorganic constituents were exhibited by the surface water samples collected from the drainage that flows between the TXI Landfill and the northern cell of the West Davis Landfill. Elevated lead concentrations also were exhibited by other surface water samples, at the seep originating from the west side of the TXI Landfill, locations downstream of this seep, and at the eastern pond on the TXI Landfill.

Lead and arsenic were detected in nearly all twenty-one (21) sediment samples collected from the Site 3 surface water sampling locations at concentrations up to 2,100J mg/kg and 55.8J^ mg/kg, respectively. The Site 3 sediment samples that generally exhibited the highest concentrations of lead and arsenic were collected from the drainage that flows between the TXI Landfill and the northern cell of the West Davis Landfill. Two (2) samples collected from surface seep locations in the southern portion of the site exhibited relatively low concentrations of several organic constituents.

Although there is no apparent geographic pattern to the distribution of lead and arsenic concentrations in surface water and sediment on Site 3, the reported levels of inorganics may be attributed to surface water runoff from localized areas of contamination on landfill surfaces or offsite property (i.e., Johnson Road adjacent to the TXI Landfill).

1.3.2.3 Surface Soil, Soil Vapor, and Subsurface Soil

Lead and arsenic concentrations of all sixty-four (64) samples (which ranged from 16.5J mg/kg to 71,500 mg/kg and from 5.75 mg/kg to 127 mg/kg, respectively) were highest in the samples collected from the area east of the northern cell of the West Davis Landfill and from the perimeter of the southern cell of the West Davis Landfill. The high concentrations appear to be coincident with the presence of battery casings and battery casing chips over much of the ground surface. Concentrations of lead and arsenic exhibited by surface soil samples collected from other Site 3 areas, including background, generally were lower by an order of magnitude or more. Of the three (3) samples analyzed for TCL organics, one (1) exhibited a pesticide compound (Aroclor-1254) at a concentration of 0.28J mg/kg. Of the seven (7) inorganic constituents detected in one or more of the nine (9) samples analyzed for TCLP, lead was detected in the two (2) samples collected from the West Davis Landfill at concentrations of 9.2 mg/L and 100 mg/L, both of which exceed the 5 mg/L regulatory limit that defines a hazardous waste by the characteristic of toxicity.

Of the ten (10) soil vapor samples collected from seven (7) borings during the direct push subtask of the soil investigation on Site 3, chlorobenzene, methane, and vinyl chloride were detected in three (3), nine (9), and four (4) samples, respectively, most of which were collected from depths where landfill material was encountered. The maximum exhibited concentrations of these compounds were 6,700 ppm chlorobenzene, 232,000

ppm methane, and 5,000 ppm and vinyl chloride. These results of these analyses prohibited subsequent subsurface activities from being conducted at proposed drilling locations directly east and south of the Dahlstrom Landfill.

From the thirty-seven (37) soil borings advanced on Site 3, twenty-four (24) subsurface soil samples were collected from various depths for laboratory analyses. In general, the detected concentrations of inorganics in shallow subsurface soil samples (collected from 0 to 3 feet bgs) were slightly higher than those exhibited by samples collected from depths greater than 3 feet bgs. However, subsurface soil samples collected from any depth in proximity to an interval where battery casing chips or other potentially contaminated landfill debris were encountered exhibited elevated concentrations of lead and arsenic. The range of lead concentrations exhibited by Site 3 subsurface soil samples was 7 mg/kg to 302 mg/kg (0 to 3 feet bgs) and up to 82.6 mg/kg (3 to 67 feet bgs). Arsenic was detected at concentrations up to 21.5 mg/kg in samples collected from 0 to 3 feet bgs, and up to 9.7Jv mg/kg in samples collected from depths greater than 3 feet bgs. Cadmium was detected in nine (9) samples at concentrations up to only 1.3J mg/kg. Overall, elevated concentrations of inorganics on Site 3 do not appear to be associated with a particular area, but rather with locations and depths where landfill debris (battery casing chips in particular) were observed to exist in the subsurface.

Several organic compounds were detected at low concentrations in thirteen (13) of the twenty-one (21) subsurface soil samples analyzed for TCL organics, with the most detections being exhibited by a sample collected from 7 to 9 feet bgs at a boring location where landfill debris was encountered to a depth of approximately 40 feet bgs. The nine (9) samples analyzed for TCLP exhibited seven (7) inorganic constituents; the concentrations of TCLP lead in four (4) of these samples, collected from depths between 0 and 12 feet bgs, ranged from 20.5 mg/L to 44.1 mg/L, all of which exceed the 5.0 mg/L level above which waste materials are classified as hazardous by the characteristic of toxicity.

1.3.2.4 Groundwater

Analytical data obtained from nine (9) groundwater samples collected using direct push methods during the soil investigation were used as a screening tool for the subsequent groundwater investigation. Lead, arsenic, and cadmium were detected in these samples

at concentrations up to 25,600 $\mu\text{g/L}$, 365Jv $\mu\text{g/L}$, and 81.1Jv $\mu\text{g/L}$, respectively. Significant concentrations of antimony, beryllium, chromium, and nickel were demonstrated by one or more of these samples as well. Several organic analytes (including several benzene compounds) were detected at concentrations up to 110 $\mu\text{g/L}$. As expected, the higher frequency of organic compound detections and the higher concentrations of organic compounds generally were exhibited by samples collected from shallow water-bearing zones in landfill debris, and high lead concentrations were exhibited by samples collected from shallow landfill debris zones containing battery casing chips.

Eighteen (18) groundwater monitoring wells were installed on Site 3. Eight (8) of these wells were screened in shallow, discontinuous, water-bearing zones in landfill material, at total depths between 9 and 40.5 feet bgs. The remaining ten (10) monitoring wells were screened in a water-bearing alluvial sand and gravel unit which is believed to be nearly continuous across most of the site, at total depths ranging from 15 to 72 feet bgs. Groundwater samples were collected all except three (3) of these wells, which that did not recharge sufficiently after development and purging.

Total lead and arsenic were detected in all seven (7) groundwater samples collected from wells screened in the landfill water-bearing zones at concentrations ranging from 8.2Jv $\mu\text{g/L}$ to 20,700 $\mu\text{g/L}$ and from 7.5L $\mu\text{g/L}$ to 107 $\mu\text{g/L}$, respectively; total cadmium was detected in four (4) samples at concentrations up to 29.5J $\mu\text{g/L}$. Dissolved lead was detected in one (1) sample at 2.9L $\mu\text{g/L}$, and dissolved arsenic in five (5) samples at concentrations up to 11.4 $\mu\text{g/L}$. Seventeen (17) TCL organic analytes were detected in one or more of the seven (7) groundwater samples collected from the wells screened in the landfill water-bearing zones at concentrations up to 79 $\mu\text{g/L}$ (4-methylphenol). The high concentrations of organic analytes and inorganic constituents in several Site 3 groundwater samples (including lead, arsenic, and cadmium, and antimony and chromium in a few samples) may be attributed to general disposal of waste materials, including battery casings and battery casing chips (which were observed in several Site 3 soil core samples at depths up to 8 feet bgs), in the Site 3 landfills.

Total lead was detected in all six (6) of the eight (8) groundwater samples collected from wells screened in the alluvial water-bearing zone at concentrations ranging from 6.1 $\mu\text{g/L}$ to 31.6 $\mu\text{g/L}$. Total arsenic was detected in seven (7) of these samples at concentrations

ranging from 3.1L $\mu\text{g/L}$ to 18.3 $\mu\text{g/L}$, and total cadmium was detected in four (4) samples at concentrations between 3.1L $\mu\text{g/L}$ and 45.1L $\mu\text{g/L}$. Dissolved arsenic was detected in three (3) samples at concentrations up to 6.0L $\mu\text{g/L}$, and dissolved cadmium in two (2) samples at concentrations up to 26LJ $\mu\text{g/L}$. The frequency of detection and detected concentrations of several total and dissolved inorganic constituents, including lead, arsenic, and cadmium, in groundwater samples collected from these wells generally were significantly lower than groundwater sampled from wells in the landfill water-bearing zones. Only four (4) organic analytes were detected in one or more of four (4) groundwater samples collected from wells screened in the alluvial water-bearing zone, at concentrations up to 49 $\mu\text{g/L}$ (1,2-dichloroethene). The moderately elevated concentrations of two (2) volatile organic compounds and lead may be attributed to migration of these constituents from nearby landfill debris zones (which contain battery casing chips) to the relatively shallow alluvial water-bearing zones in which the wells are installed.

Overall, the sample results indicate no apparent geographic pattern to the distribution of organic and inorganic constituent concentrations in Site 3 shallow groundwater. The relatively high concentrations exhibited by groundwater from isolated wells across the site may be indicative of the composition of the subsurface material in which the well is screened, or an interval close to the screened interval (i.e., one that contains battery casing chips). The groundwater in alluvial sand and gravel above the Eagle Ford Shale appears to have been affected only minimally by contamination from shallower landfill water-bearing zones.

1.3.3 Site 4

The RI activities at Site 4 included sampling stormwater, surface water, sediment (from both storm sewers and surface water bodies), surface and subsurface soil, and groundwater. All water and sediment samples were analyzed for TAL inorganics, and a selected subset of these samples also were analyzed for TCL organics and/or TCLP organics and inorganics (sediment only). All surface and subsurface soil samples were analyzed in the field for inorganics using XRF methods, and a selected subset of these samples was submitted for TAL inorganics analysis; a few soil samples also were

submitted for TCL organics and TCLP analyses. Groundwater samples were submitted for TAL inorganics analysis, as well as TCL organics on a few select samples.

Site 4 is the location of four (4) former City of Dallas municipal landfills. The property comprising three (3) of the landfills (West Dallas, Nomias, and Vilbig) is characterized by flat to gently rolling terrain and opportunistic vegetation. The ground surface over the former landfills is slightly raised, and the property is bounded by surface water drainage channels to the southwest, west, north, and northeast. Battery chips and slag are observable on the ground surface over much of the central and western portions of the site. Apparently uncontrolled surface dumping of construction, household, and municipal debris over three of the landfill areas continues today, as access is not entirely restricted. the property comprising the former Jaycee Park Landfill is now Jaycee Park, and is flat, sodded, and bounded by a school to the north, residential property to the east and west, and commercial businesses to the south.

1.3.3.1 Stormwater and Sediment

Water samples collected from six (6) storm sewer structures on Site 4 exhibit relatively elevated levels of several inorganic constituents, including lead, which was detected in these samples at concentrations up to 3,720 $\mu\text{g/L}$. Stormwater sampled from the inlet structure located near the corner of Iroquois and Gallagher Streets on the eastern perimeter of the Vilbig Landfill on Site 4 exhibited the highest frequency of occurrence of total and dissolved inorganics, including total lead, arsenic, and cadmium (3,720 $\mu\text{g/L}$, 105 $\mu\text{g/L}$, and 13.3 $\mu\text{g/L}$, respectively), and dissolved lead and arsenic (4.8J $\mu\text{g/L}$ and 45.2 $\mu\text{g/L}$, respectively). This inlet receives runoff from the adjacent roads and the Vilbig Landfill ground surface (where apparently uncontrolled surface dumping of household municipal and construction waste has occurred). A few organic constituents were detected in these samples at relatively low concentrations (up to 13B $\mu\text{g/L}$ methylene chloride).

The analytical results for the two (2) sediment samples collected from the two structures off Iroquois Street indicated relatively high levels of lead (211JV mg/kg and 4,220J mg/kg), in addition to detections of arsenic (up to 7.8J mg/kg), cadmium (0.73 mg/kg), and detections of several constituents at relatively low concentrations.

1.3.3.2 Surface Water and Sediment

Seven (7) surface water samples were collected from two (2) drainages which bound Site 4: the Old Channel of the West Fork of the Trinity River flows north (along the west side of Site 4) from Singleton Boulevard, and joins a drainage channel which flows east along the south side of the Trinity River Levee (along the north side of Site 4). Total lead was detected in five (5) samples at concentrations ranging from 3.7 $\mu\text{g/L}$ to 8.2 $\mu\text{g/L}$. Dissolved lead, and total and dissolved arsenic, were detected in nearly all Site 4 surface water samples at concentrations up to 6 $\mu\text{g/L}$, 181 $\mu\text{g/L}$, and 140 $\mu\text{g/L}$, respectively. Several organic constituents were detected in these samples at concentrations up to 9B $\mu\text{g/L}$ (methylene chloride).

Lead was detected in four (4) of the seven (7) sediment samples collected from Site 4 at concentrations ranging from 41.7J mg/kg to 265JV mg/kg, arsenic was detected in three (3) samples at concentrations ranging from 7JV mg/kg to 19.2 mg/kg, and cadmium was detected in one (1) sample at 4.6J mg/kg. Several organic compounds were detected at concentrations up to 3.7J (pyrene). In general, the sediment samples collected from the levee drainage channel generally exhibited higher concentrations of inorganic constituents, including lead, arsenic, and cadmium, than the samples collected than from the Old Channel of the Trinity River. may be attributed to runoff from an area of the landfill where battery casing chips are present, or from other offsite sources.

Although there is no apparent geographic pattern to the distribution of lead and arsenic concentrations in surface water and sediment on Site 4, the reported levels of lead and other inorganics detected in certain samples (particularly the sample located near the northwest corner of Site 4) may be attributed to surface water runoff from landfill surfaces, groundwater recharge from subsurface landfill debris zones, or from adjacent offsite property (i.e., Loop 12).

1.3.3.3 Surface Soil, Soil Vapor, and Subsurface Soil

The eighty (80) Site 4 surface soil samples exhibited elevated levels of several inorganics, which appear to be highest in the vicinity of the West Dallas Landfill. Lead and arsenic were detected in all to nearly all surface soil samples at concentrations ranging from 9.1J

mg/kg to 6,390J mg/kg, and up to 186 mg/kg, respectively. Cadmium was detected in forty-nine (49) of these samples at concentrations up to 8.7 mg/kg. The higher concentrations of these constituents appear to coincide with the presence of battery casing chips on the ground surface in this area. Inorganic constituent concentrations exhibited by samples collected from other areas of Site 4, including background, generally were lower by an order of magnitude or more. Six (6) organic compounds were detected in the sample collected for TCL organics analysis at concentrations up to 0.35J mg/kg (bis(2-ethylhexyl)phthalate).

Methane concentrations in the two (2) soil vapor samples collected from a direct push boring during the soil investigation were 2.3 ppm (10 feet bgs) and 1.9 ppm (20 feet bgs). Due to these results and to a lack of significant readings obtained by continuous air monitoring during subsurface activities, it was determined that additional soil vapor sampling at Site 4 was unnecessary.

From the thirty-three (33) soil borings advanced on Site 4, subsurface soil samples were collected from various depths. In general, the detected concentrations of inorganics were reported higher in the shallower soil samples. Lead, arsenic, and cadmium were detected at concentrations up to 11,500J mg/kg, 114J mg/kg, and 15.1 mg/kg, respectively, in samples collected from 0 to 3 feet bgs, and up to 2,060 mg/kg, 58.5 mg/kg, and 4.8 mg/kg in samples collected from depths below 3 feet bgs. The concentrations of inorganics reported for shallow subsurface (0 to 3 feet bgs) samples generally were higher within West Dallas Landfill and the western portion of Nomas Landfill, both of which are characterized by the presence of battery chips over much of the ground surface. Higher concentrations were exhibited by deeper subsurface soil samples only in instances where landfill debris (usually containing battery casing chips) was encountered in the subsurface. Concentrations of lead and arsenic in subsurface soil collected in other Site 4 areas, including background, generally were lower than those described above by an order of magnitude or more. Several organic compounds were detected at concentrations up to 0.33J mg/kg (di-n-butylphthalate) in one or more the fifteen (15) surface soil samples analyzed for TCL organics. The four (4) samples analyzed for TCLP exhibited six (6) inorganic constituents, including lead, which was detected in one (1) of these samples (from a boring location where battery casing chips were encountered to a depth of 3 feet bgs) at 5.87 mg/L. The level above which waste materials are classified as hazardous by the characteristic of toxicity is 5.0 mg/L.

1.3.3.4 Groundwater

Thirteen (13) monitoring wells were installed on Site 4 and screened in water-bearing, coarse-grained alluvial material/landfill debris overlying the Eagle Ford Shale, to depths between 12 and 26 feet bgs. Groundwater samples collected from these wells exhibited total lead concentrations ranging from 7.6 $\mu\text{g/L}$ to 2,010 $\mu\text{g/L}$. Total arsenic was detected in twelve (12) samples at concentrations up to 142 $\mu\text{g/L}$, and total cadmium was detected in one (1) sample at a concentration of 3.4 $\mu\text{g/L}$. Although dissolved lead and cadmium were not detected in any of these samples, dissolved arsenic was detected in ten (10) samples at concentrations up to 21.5 $\mu\text{g/L}$. Several TCL organic compounds were detected in nearly all of the Site 4 groundwater samples, particularly benzene and chlorobenzene, which were detected at concentrations up to 25 $\mu\text{g/L}$ and 300 $\mu\text{g/L}$, respectively.

In general, the Site 4 groundwater data indicate no apparent geographic pattern to the distribution of organic and inorganic constituent concentrations in Site 4 shallow groundwater. The relatively high concentrations exhibited by groundwater from isolated wells across the site may be indicative of the composition of the subsurface material in which the well is screened, or an interval close to the screened interval (i.e., one that contains battery casing chips).

1.4 Baseline Risk Assessment

A Human Health Risk Assessment (HHRA) has been prepared using the OU No. 3 RI data and is presented in the document titled *Baseline Human Health Risk Assessment, RSR Corporation Superfund Site, Operable Unit No. 3 (EPA, 1996b)*. The objective of the baseline HHRA is to evaluate qualitatively and/or quantitatively the potential health risks associated with OU No. 3. The results of the assessment will be used to provide risk managers with an understanding of the potential risks to human health and any uncertainties associated with the assessment. This information will be used to help determine the need for future remedial action.

The baseline HHRA evaluates potential threats to the public in the absence of any remedial actions. The no-action alternative assumes no corrective actions take place and no restrictions are placed on future uses of the area. Evaluation of this no-action plan alternative is required under the NCP, 40 C.F.R., §300.430.

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1.4.1 Chemical Selection

Data that were used in the chemical selection include surface soil, subsurface soil, sediments, and surface water. Groundwater and landfill gas were not evaluated because they are incomplete pathways. Potential exposure to contaminants in groundwater is considered remote based on groundwater use patterns in the area. The major aquifers in the area, the Paluxy and Twin Mountains aquifers, begin at depths of 1,300 to 1,500 feet bgs. Due to the depth of these aquifers and the confining nature of the stratigraphy between these aquifers and any groundwater encountered at shallower depths, the likelihood of groundwater in these aquifers becoming affected by surface or shallow groundwater contamination is considered minimal. It is unlikely an individual resident would be legally capable of installing a private well within the boundaries of the RSR Site due to City ordinances, which require platted property to have provisions for water and sewer service.

Potential exposure to landfill gas is also considered remote. Soil gas data for the landfills indicate measurable concentrations of gas detected on Site 3. Under the current site setting, exposure is not anticipated as Site 3 is undeveloped with the exception of the Pick-n-Pull, and landfill gas was not detected in this area. Under future site conditions, state regulations require any structures built on landfills to include gas venting/control features.

Concentrations of metals detected in soil and sediment samples were compared to regional background soil concentrations. Metals were eliminated as soil COPCs for the HHRA if the maximum soil concentration of the metal in OU No. 3 was less than the estimated upper-bound regional background concentration (i.e., mean plus two standard deviations) and the onsite mean value was not significantly different from the onsite background concentration. In addition, iron, magnesium, calcium, potassium, and sodium (essential human nutrients [EPA, 1989]) were eliminated as COPCs for all media.

For media other than soil and sediment, all chemicals detected in at least one (1) sample except essential human nutrients, were included as COPCs.

1.4.2 Exposure Assessment

The following exposure scenarios and pathways were quantitatively evaluated in the HHRA for each site:

1.4.2.1 Site 1

Exposure scenarios quantitatively evaluated in the HHRA for Site 1 included:

- **Current and future child and resident adults:** incidental ingestion of soil, inhalation of fugitive dust, and dermal contact with soil
- **Current and future child and adult trespasser:** incidental ingestion of soil, inhalation of fugitive dust, dermal contact with soil, dermal contact with surface water, and ingestion and dermal contact with sediment
- **Current and future worker:** incidental ingestion of soil, inhalation of fugitive dust, and dermal contact with soil

1.4.2.2 Site 3

Exposure scenarios quantitatively evaluated in the HHRA for Site 3 included:

- **Current and future child and adult trespasser:** incidental ingestion of soil, inhalation of fugitive dust, dermal contact with soil, dermal contact with surface water, and ingestion and dermal contact with sediment
- **Current and future worker:** incidental ingestion of soil, inhalation of fugitive dust, and dermal contact with soil

1.4.2.3 Site 4

Site 4 was subdivided into two (2) areas: the landfills on the north side of Site 4 and the Jaycee Park. The closed landfills are currently zoned for residential use; however, TNRCC closely regulates development of closed municipal solid waste landfills for residential housing (30TAC330 Subchapter T). In addition, the City of Dallas is working with EPA Region VI to change the zoning of the former landfills located in Site 4 from residential to nonresidential uses. As a result of these regulatory developments, the former landfills on Site 4 will not be viewed as areas suitable for future residential development. Subsequent evaluation of the landfills will be limited to considering future commercial or industrial land uses and exposure related to those activities. Exposure scenarios quantitatively evaluated in the HHRA for Site 4 landfills included:

- **Current and future child and adult trespasser:** incidental ingestion of soil, inhalation of fugitive dust, dermal contact with soil, dermal contact with surface water, and ingestion and dermal contact with sediment
- **Future worker:** incidental ingestion of soil, inhalation of fugitive dust, and dermal contact with soil

The exposure scenarios that were quantitatively evaluated in the HHRA for Jaycee Park included:

- **Current adult and child resident:** incidental ingestion and dermal contact of soil and inhalation of fugitive dust
- **Current and future child trespasser:** dermal contact of surface water in open storm drains

Exposure scenarios were evaluated using standard EPA default exposure parameters for average (typical) and Reasonable Maximum Exposure (RME) conditions.

1.4.3 Risk Characterization

A summary of estimated lifetime excess cancer risks and hazard indices (HIs) for the residential child (Site 1) and for the future worker (Sites 3 and 4) exposure scenarios is presented in **Table 1-1**. These risks are for all COCs except lead. Exposure to lead was evaluated separately from the other COCs because toxicity values are not available for lead. The residential child scenario is the most conservative of the scenarios that were evaluated for OU No. 3, Site 1. The future worker scenario is the most conservative of the scenarios evaluated for Sites 3 and 4. Consequently, these scenarios yielded the highest risks. For the most conservative scenarios, all total lifetime excess cancer risks and/or HIs exceed 1×10^{-6} for carcinogens and unity for noncarcinogens respectively, except for the Sites 3 and 4 future worker HI (0.3).

These criteria (total lifetime excess cancer risk of 1×10^{-6} and HI of unity) are the "points of departure" for risk management decisions, as described in the NCP. The greatest calculated cancer risk across all exposure pathways (9×10^{-3}) is associated with current child resident exposure to soils (surface soil) in Site 1. The greatest noncancer risk in **Table 1-1**, is also associated with current child resident exposure to soils (surface soil) in Site 1 under both typical and RME conditions.

The Integrated Exposure Uptake Biokinetic Model (IEUBK) was used to predict the blood-lead effects from lead exposure on children ages 0 to 6 years. The model was applied to those areas of OU No. 3 expected to be inhabited by children under current or future conditions. These results indicated the following:

- For Site 1 under current or future residential conditions, the predicted geometric mean blood-lead concentration was about 41 $\mu\text{g/dL}$. An estimated 99 percent of the exposed population would be expected to exhibit a blood-lead concentration greater than 10 $\mu\text{g/dL}$ based on soil-lead concentrations measured in Site 1.

Table 1-1
Summary of Risks
RSR Corporation Superfund Site
OU No. 3

Pathway	Typical Lifetime Excess Cancer Risk	RME Lifetime Excess Cancer Risk	Typical Hazard Index	RME Hazard Index
Site 1: Current Residential Child				
Inhalation	2E-05	6E-05	1.1E+00	1.1E+00
Ingestion	3E-03	8E-03	3.9E+02	3.9E+02
Dermal	2E-09	1E-08	1.4E-01	6.8E-01
Total	3E-03	9E-03	4E+02	4E+02
Site 3: Future Worker				
Inhalation	1E-06	3E-06	1.7E-01	1.7E-01
Ingestion	2E-06	6E-06	8.9E-02	8.9E-02
Dermal	3E-07	4E-06	1.2E-02	5.8E-02
Total	3E-06	1E-05	3E-01	3E-01
Site 4: Future Worker				
Inhalation	1E-06	3E-06	1.8E-01	1.8E-01
Ingestion	2E-06	7E-06	7.4E-02	7.4E-02
Dermal	5E-08	7E-07	2.4E-03	1.2E-02
Total	4E-06	1E-05	3E-01	3E-01
Site 4: Jaycee-Zargosa Future Residential Child				
Inhalation	3E-07	9E-07	3.4E-01	3.4E-01
Ingestion	2E-05	4E-05	2.1E+00	2.1E+00
Dermal	N/A	N/A	1.4E-03	7.1E-03
Total	2E-05	4E-05	2E+00	2E+00

- For Site 4 (Jaycee Park) under current and future residential use conditions, the predicted geometric mean blood-lead concentration was about 4 $\mu\text{g/dL}$; less than 5 percent of the exposed population would be expected to exhibit a blood-lead concentration greater than 10 $\mu\text{g/dL}$ based on the soil-lead concentrations measured in this portion of Site 4.

Using the methodology from **Bowers et al. (1994)** to estimate the potential for lead-related risks to adult workers combined with default exposure parameters developed by EPA Region VIII and used by EPA Region VI, a soil-lead concentration of about 2,000 mg/kg was estimated as a point of comparison to site-specific soil data. This value represents the soil-lead concentration for a worker population where no more than 5 percent exhibit a blood-lead concentration greater than 10 $\mu\text{g/dL}$. The 10 $\mu\text{g/dL}$ blood-lead level was selected to be protective of pregnant women.

Based on comparison to 2,000 mg/kg, soil data collected for Sites 1, 3, and 4 show that 13 locations on Site 1, 10 locations on Site 3, and 9 locations on Site 4 exceed this threshold. However, when data for each individual site were aggregated to calculate the geometric mean lead concentration in soil, each site exhibits a mean lead concentration less than 2,000 mg/kg.

1.4.4 Uncertainty

Many simplifying assumptions were made to estimate the risks in the HHRA. Uncertainties in this HHRA, and HHRAs in general, are due to uncertainties in the methodologies used in HHRAs, specific uncertainties in characterizing the RSR Site, and uncertainties describing exposure.

The HHRA is subject to uncertainty from a variety of sources including the following:

- Sampling, analysis, and data evaluation
- Fate and transport estimation
- Exposure estimation
- Toxicological data
- Blood-lead models

While not all-encompassing, the following identifies a number of site-specific factors that may lead to an overestimation or underestimation of risks for the RSR OU No. 3 Site:

- Analyses for the metals were not species-specific, therefore metals were assumed to be completely bioavailable, which may overestimate risks.
- Contaminant concentrations in soil, sediment, and surface water were assumed to remain constant, which may result in overestimation or underestimation of future risks.
- IEUBK model default values were used for some intake and adsorption parameters because site-specific values are not available. Risks may be overestimated or underestimated if characteristics of the exposed population at the site differ from these default assumptions.
- Uncertainty is associated with the IEUBK model results based on mean soil-lead concentrations for the exposure area. The daily activity pattern of some children could result in exposures over a limited area of the OU. The mean soil-lead concentration for all soil samples may not be representative of their actual exposure.

1.4.5 Ecological Risk Assessment

An ecological risk assessment (ERA), was conducted for the OU No. 3 environment to quantitatively determine the actual or potential effects to onsite aquatic and terrestrial life. The ERA was conducted as a part of the RI process in order to evaluate if the COPCs from the RSR facility pose a risk to the environment in the absence of remedial action. A summary of the ERA is provided in the following paragraphs.

OU No. 3 includes three (3) sites that contain both aquatic and terrestrial habitat. In general, terrestrial habitats for all sites are disturbed in many areas by historical and/or ongoing human activity. The majority of the aquatic habitat is intermittent and can be dry several months of the year. Many of the drainages are fed by stormwater runoff.

A preliminary site investigation was conducted to determine potential ecological receptor populations. It was noted that the predominant populations are made up of opportunistic small mammals (i.e., house mice, deer mice, and hispid cotton rats) and opportunistic aquatic species (fathead minnows, mosquito fish, and crayfish). A quantitative assessment was conducted to assess the exposure and risk to these resident organisms. This approach entailed the evaluation of site exposure conditions by comparison of exposure point concentrations to literature derived toxicity benchmark values (for the terrestrial assessment) or ambient water quality criteria and sediment toxicity benchmarks (for the aquatic assessment). The derived upper 95 percent confidence limit (UCL) for the log-normal data distribution was used for the media exposure point concentration, unless the value was greater than the observed maximum concentration. If the UCL was greater than the maximum concentration, then the maximum was used as the exposure point concentration.

Inorganic COPCs were initially selected by comparison to regional background for sediment and soils. There were no appropriate background concentrations for surface water; therefore, this step was not used for surface water COPC determination. All detected organic COPCs (in all media) were retained for analysis within the ERA.

An evaluation of surface water and sediment exposure and risk to aquatic life was performed. In addition, an evaluation of surface water and surface soil exposure and risk to terrestrial life was conducted. For the determination of aquatic risk, the surface water and sediment exposure point concentration was compared directly to ambient water quality criteria and sediment toxicity benchmark values, respectively. Site-specific conditions of hardness were used to calculate water quality criteria for hardness dependent metals. Site conditions of total organic carbon (TOC) were used to calculate criteria for acenaphthene, fluoranthene, and phenanthrene in sediment using EPA guidance techniques. Both the acute and chronic ambient water quality criteria were used for comparison to COPC surface water concentrations to develop a range of hazard quotients within the risk characterizations. Similarly, a range of sediment hazard quotients were also used to bracket the range of risk attributable to aquatic life exposure.

An evaluation of surface water and surface soil exposure and risk to terrestrial life was conducted by comparison of the surface water exposure point concentrations to literature-derived wildlife benchmark values, and by comparison of a calculated exposure dose for

ingested soil and contaminated food to diet benchmark values. An assessment for deer mice and great blue heron was conducted. Observed surface water COPC and calculated diet concentrations were compared to literature derived no observed adverse effect levels (NOAEL) to determine risk.

Risk was quantified using the hazard quotient method. If the resulting quotient was greater than one (1), the analyte was considered to contribute to potential ecological risk. Results for the evaluation of COPC risk to aquatic and terrestrial life were as follows:

1.4.5.1 Site 1

- The presence of manganese in surface water is of concern to aquatic life.
- The presence of lead in sediment is of concern to aquatic life.
- The presence of antimony, arsenic, and lead in soil is of concern to deer mice.
- The presence of antimony, arsenic, lead, copper, and zinc in soil is of concern to terrestrial plants.

1.4.5.2 Site 3

- The presence of lead and manganese in surface water is of concern to aquatic life.
- Lead is of concern in sediment to aquatic life.
- Arsenic and lead in soils are of concern to deer mice, while lead is also of concern to terrestrial plants.

1.4.5.3 Site 4

- The presence of barium and manganese in surface water is of concern to aquatic life.
- Lead and manganese in sediment are of concern to aquatic life.

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However, it should be noted that the assessment of risk to terrestrial organisms was highly conservative. In general, terrestrial animals receive the majority of their dietary water from food sources, not from surface water bodies. In addition, the majority of the drainages within OU No. 3 are intermittent, and would therefore only create an exposure pathway during precipitation events.

1.5 Applicable or Relevant and Appropriate Requirements Summary

Remedial action alternatives developed in this FS are presented in relation to whether they satisfy ARARs, per EPA guidance.

Compliance with ARARs and overall protection of human health and the environment are the two minimum, or "threshold," criteria that must be met by all alternatives. There are other criteria that "balance" and "modify" the alternatives that meet the threshold criteria. An evaluation of the alternatives using the balancing criteria is presented in later sections of this FS.

ARARs include promulgated environmental requirements, criteria, standards, and other limitations. Other factors are "To Be Considered" (TBC). TBCs in remedy selection may include nonpromulgated standards, criteria, and advisories, but these are not evaluated pursuant to the formal process required for ARARs. The substantive portions of the ARARs of federal, state, and tribal governments must be complied with during Superfund response actions. Local ordinances with promulgated criteria or standards are not considered ARARs but may represent TBCs.

1.5.1 Definition of Applicable or Relevant and Appropriate Requirements

A requirement under other environmental laws may be either "applicable" or "relevant and appropriate" but not both. Identification of ARARs must be done on a site-specific basis and involves a two-part analysis: First, a determination whether a given requirement is applicable. Then if it is not applicable, a determination whether it is nonetheless both relevant and appropriate.

1.5.1.1 Applicable Requirements

Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a Superfund site.

1.5.1.2 Relevant and Appropriate Requirements

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that are well suited to the particular site. While not necessarily "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a Superfund site, relevant and appropriate requirements address problems or situations sufficiently similar to those encountered at the Superfund site that their use is justified.

The determination that a requirement is relevant and appropriate is a two-step process: (1) determination if a requirement is relevant, and (2) determination if a requirement is appropriate. In general, this involves a comparison of a number of site-specific factors, including the characteristics of the remedial action, the hazardous substance present at the site, or the physical circumstances of the site, with those addressed in the statutory or regulatory requirement. In some cases, a requirement may be relevant but not appropriate; it is possible for only part of a requirement to be considered relevant and appropriate in a given case. When the analysis results in a determination that a

requirement is both relevant and appropriate, such a requirement must be complied with to the same degrees as if it were applicable.

1.5.1.3 "To Be Considered" Material

TBCs are nonpromulgated federal or state advisories or guidance that are not legally binding and do not have the status of potential ARARs. However, in many circumstances, TBCs will be considered along with ARARs as part of the site risk assessment and may be used in determining the necessary level of cleanup for protection of human health or the environment.

1.5.2 Types of Applicable or Relevant and Appropriate Requirements

There are several different types of requirements with which Superfund actions may have to comply. The classification of ARARs below was developed to provide guidance on how to identify and comply with ARARs. However, some requirements may not fall neatly into this classification system.

- **Ambient or chemical-specific requirements** are usually health- or risk-based numerical values or methodologies that, when applied to site-specific conditions, result in the establishment of numerical values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment.
- **Performance, design, or other action-specific requirements** are usually technology- or activity-based requirements or limitations on actions taken with respect to hazardous wastes.
- **Location-specific requirements** are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they occur in special locations.

CERCLA requires that remedial actions comply with both federal and state ARARs (CERCLA §121(d)(2)(A)). In order for a state requirement to be an ARAR, it must meet the following three criteria:

- It must be a promulgated standard, requirement, criteria, or limitation under a state environmental or facility siting law.
- It must be more stringent than federal requirements.
- It must meet the definition of an ARAR.

Appendix A presents OU No. 3 ARARs for the following media:

- Solid Waste (Tables A1-A3)
- Soils (Tables A4-A6)
- Surface Water (Tables A7-A8)
- Air (Tables A9-A10)
- Miscellaneous location-specific (Table A11)

Federal and state chemical-specific, location-specific, and action-specific ARARs are presented.

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Section 2
Remedial Action Objectives and General Response Actions

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Remedial Action Objectives and General Response Actions

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2.1 Introduction

This section presents the Remedial Action Objectives (RAOs) and GRAs for OU No. 3 using the presumptive remedy approach. EPA has undertaken an initiative to develop presumptive remedies to accelerate cleanups at certain categories of sites with similar characteristics. The presumptive remedy approach is one tool of acceleration within the Superfund Accelerated Cleanup Model (SACM).

The objective of the presumptive remedy approach is to use the program's past experience to streamline site investigations and speed up selection of cleanup actions (EPA, 1993c). Presumptive remedies streamline the FS by eliminating the technology identification and screening step. As a result, the FS is focused on consideration of the No Action Alternative and the presumptive remedy technologies.

Containment technologies are the presumed remedy for municipal landfills because the volume of waste and heterogeneity of the waste generally make treatment impracticable (EPA, 1993a). Section 300.430(a)(iii)(B) of the NCP states the expectation that engineering controls, such as containment, will be used for wastes that pose a relatively low long-term threat or where treatment is impracticable. The presumptive remedy for landfills relates primarily to containment of the landfill mass and collection and/or treatment of landfill gas. In addition, measures to control landfill leachate and groundwater may also be implemented as part of the presumptive remedy.

The components of the presumptive remedy for municipal landfills generally are:

- Landfill cap
- Source area groundwater control to contain plume
- Leachate collection/treatment
- Landfill gas collection and treatment
- Institutional controls to supplement engineering controls

The EPA *Guidance on Presumptive Remedy for CERCLA Municipal Landfill Sites* (EPA, 1993a) states that the universe of alternatives that will be analyzed in detail may be limited to the components of containment described above, thus eliminating the need to perform the initial identification and screening of site-specific alternatives. For Site 1, the GRAs, remedial technologies, and process options are similar to Sites 3 and 4. The general response actions for Site 1 are therefore encompassed in the actions associated with the presumptive remedies for Sites 3 and 4.

The first step in developing containment alternatives is to develop RAOs. The RAOs are based on the risk assessment and ARARs analysis. **Table 2-1** summarizes the COCs, risk assessment results, and ARARs for each site in OU No. 3 and provides the basis for developing RAOs.

For Site 1, the RME lifetime excess cancer risk could be as much as 9×10^{-3} and the HI is 390 for the future child residential scenario (the most conservative scenario evaluated for Site 1). In addition, arithmetic mean values of arsenic and lead exceed target cleanup goals of 20 ppm and 500 ppm, respectively. The target cleanup goals were established previously for OU Nos. 1 and 2 and are based on residential risk-based calculations. These results show that risks associated with exposure to Site 1 exceed the acceptable risk range of 1×10^{-6} to 1×10^{-4} and an acceptable HI of less than 1. Therefore, RAOs for Site 1 are based on reduction of risks.

For Site 3, the RME lifetime excess cancer risk could be as much as 1×10^{-5} and the HI is less than 1.0 for the future worker exposure scenario (the most conservative scenario evaluated for Site 3). The arithmetic mean value of arsenic and the geometric mean value of lead in soil and sediment are less than the target cleanup goals of 32.7 ppm and 2,000 ppm, respectively. These target cleanup goals are based on worker exposure. The 2,000 ppm target cleanup goal for lead is based on an adult blood-lead model that uses the geometric mean value for lead in an exposure area to predict blood-lead levels in exposed workers. Risks for Site 3 fall within the risk management range for excess lifetime cancer risk and the HI is less than 1. Therefore, RAOs for Site 3 are based on ARARs.

For Site 4 (excluding Jaycee Park), the RME lifetime cancer risk could be as much as 1×10^{-5} and the HI is less than 1.0 for the future worker exposure scenario (the most

Table 2-1
Basis for Establishing RAOs for OU No. 3
RSR Corporation Superfund Site

Media	COC*	Arithmetic Mean (Geometric Mean) (ppm)	Range (ppm)	Risk Assessment Results ^b	Action-Specific ARARs	Remedial Action Objectives Conclusions	Target Cleanup Goal ^c (mg/kg)
Site 1				Site Risk: 9×10^{-3} HI: 390	Soils, battery chips and slag are RCRA characteristic waste based on lead and arsenic concentrations; RCRA requirements (30 T.A.C. § 335.8) are relevant and appropriate.	Risk less than 10^{-4} and Hazard Index greater than 1. Many samples exceed target cleanup goals and exceed TCLP criteria. 30 T.A.C. § 335.8 specifies closure and remediation requirements.	Arsenic: 20 (residential) Lead: 500 (residential)
Soils (Surface)	Arsenic	684	10-7,980	RME Excess Lifetime Cancer Risk: 9×10^{-3} HI: 390			
	Lead	11,111 (1,818)	57-105,000				
Soils (0-10 ft)	Arsenic	625	10-7,980	RME Excess Lifetime Cancer Risk: 4×10^{-4} HI: 280			
	Lead	10,286 (1,729)	57-105,000				
Sediments	Arsenic	34	7-224	RME Excess Lifetime Cancer Risk: 4×10^{-5} HI: <1			
	Lead	586 (147)	6-3,940				
Surface Water (total)	Arsenic	.035	.004-.187	RME Lifetime Excess Cancer Risk: 5×10^{-6} HI: <1			
	Lead	.075	.002-.318				
Site 3				Site Risk: 1×10^{-5} HI: <1	Some soils, battery chips and slag may be RCRA characteristic waste; RCRA requirements (30 T.A.C. § 335.8) are relevant and appropriate.	Risk falls within 10^{-4} to 10^{-6} risk range with a hazard Index <1. Some samples exceed target cleanup goals and are TCLP hazardous. 30 T.A.C. § 330.251 closure requirements for municipal solid waste landfills must be met. 30 T.A.C. § 335.8 specifies RCRA closure and remediation requirements.	Arsenic: 32.7 (occupational) Lead: 2,000 (occupational)
Soils (Surface)	Arsenic	15	6-127	RME Excess Lifetime Cancer Risk: 2×10^{-6} HI: <1			
	Lead	2,875 (288)	18-71,500				
Soils (0-10 ft)	Arsenic	15	30-127	RME Excess Lifetime Cancer Risk: 2×10^{-6} HI: <1			
	Lead	2,590 (247)	7-71,500				
Sediments	Arsenic	14	4-56	RME Excess Lifetime Cancer Risk: 2×10^{-6} HI: <1			
	Lead	224 (67)	11-2,100				
Surface Water (total)	Arsenic	.008	.002-.047	RME Excess Lifetime Cancer Risk: 1×10^{-7} HI: <1			
	Lead	.128	.001-1.700				
Site 4 (Landfill Areas)				Site Risk: 3×10^{-5} HI: <1	Some soils, battery chips and slag may be RCRA characteristic waste; RCRA requirements (30 T.A.C. § 335.8) are relevant and appropriate.	Risk falls within 10^{-4} and 10^{-6} risk range; Hazard Index exceeds 1. Some samples exceed target cleanup goals and are TCLP hazardous. 30 T.A.C. § 330.251 closure requirements for municipal solid waste landfills must be met. 30 T.A.C. § 335.8 specifies RCRA closure and remediation requirements.	Arsenic: 32.7 (occupational) Lead: 2,000 (occupational)
Soils (Surface)	Arsenic	29	3-252	RME Excess Lifetime Cancer Risk: 1×10^{-5} HI: <1			
	Lead	623 (229)	9-6,390				
Soils (0-10 ft)	Arsenic	21	4-252	RME Excess Lifetime Cancer Risk: 1×10^{-5} HI: <1			
	Lead	838 (260)	9-11,500				
Sediment	Arsenic	10	4-20	RME Excess Lifetime Cancer Risk: 7×10^{-6} HI: <1			
	Lead	106 (65)	26-364				
Surface Water (total)	Arsenic	.060 µg/l	<.001-.181 µg/l	RME Excess Lifetime Cancer Risk: 1×10^{-6} HI: <1			
	Lead	.006 µg/l	.002-.008 µg/l				

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Table 2-1 Basis for Establishing RAOs for OU No. 3 RSR Corporation Superfund Site							
Media	COC*	Arithmetic Mean (Geometric Mean) (ppm)	Range (ppm)	Risk Assessment Results*	Action-Specific ARARs	Remedial Action Objectives Conclusions	Target Cleanup Goal ^c (mg/kg)
Site 4 (Jaycee Park)				Site Risk: 4×10^{-3} HI: 2	Some soils, battery chips and slag may be RCRA characteristic waste; RCRA requirements (30 T.A.C. § 335.8) are relevant and appropriate.	Risk falls within 10^{-4} and 10^{-6} ; Hazard Index exceeds 1.	Arsenic: 20 (residential)
Soil (Surface)	Arsenic	15	4-27	RME Excess Lifetime Cancer Risk: 4×10^{-5} HI: 2.4		Some samples exceed target cleanup goals and are TCLP hazardous.	Lead: 500 (residential)
	Lead	408 (159)	9-1,200				
Surface Water (Total)	Arsenic	.002	1.6	RME Excess Lifetime Cancer Risk: 1×10^{-4} HI: <1		30 T.A.C. § 330.251 closure requirements for municipal solid waste landfills must be met.	30 T.A.C. § 335.8 specifies RCRA closure and remediation requirements.
	Lead	.001	1.3				
*COCs representing the most significant percentage of risk are summarized. *Most conservative exposure scenario risk numbers are summarized. For Site 1, future residential child is the most conservative, and for Sites 3 and 4, future worker is the most conservative. *Target cleanup goals for Site 1 are based on RSR residential cleanup criteria for arsenic and lead previously developed in OU Nos. 1 and 2. Sites 3 and 4 target cleanup goals are based on worker exposure target cleanup goals. Notes: HI = Hazard Index							

conservative scenario evaluated for Site 4). The mean values of arsenic and lead in soil and sediment are less than the target cleanup goals of 32.7 ppm and 2,000 ppm, respectively. These target cleanup goals are based on worker exposure. Risks for Site 4 (excluding Jaycee Park) fall within the risk management range for excess lifetime cancer risk and the HI is less than 1. Therefore, RAOs for Site 4 are based on ARARs.

For Jaycee Park, the RME lifetime excess cancer risk could be as much as 4×10^{-5} and the HI is 2 for the child residential scenario (the most conservative scenario evaluated for Jaycee Park). The mean values of arsenic and lead in soil exceed target cleanup goals of 20 ppm and 500 ppm, respectively. In addition, some samples exceed the target cleanup goal for antimony of 108 ppm. A target cleanup goal is included for antimony because antimony is a contributor (greater than 20 percent of the risk) to noncarcinogenic risk in Jaycee Park. These results indicate that the HI for Jaycee Park exceeds 1. Therefore, the RAOs for Jaycee Park are based on reduction of risks.

RAOs are presented in the following subsection. The response actions, technologies, and process options are then presented based on the containment presumptive remedy and selected hot-spot removals.

2.2 Remedial Action Objectives

RAOs for RSR Site OU No. 3 contaminated media are described in this section. RAOs have been developed for those media that pose a significant risk to human health and the environment based on ARARs and site-specific risk calculations presented in the HHRA, which is summarized in **Sections 1.4** and **1.5** of this FS. The RAOs refer to specific sources, contaminant pathways, and receptors. **Table 2-1** presents a summary of the media of concern and their respective COCs, concentration ranges, HHRA results, ARARs, RAO conclusions, and target cleanup goals. This information was then used to establish RAOs for OU No. 3 and the focus of this FS.

Table 2-2 presents RAOs for the following media:

- Soils (including landfill soils)
- Surface Water/Storm Water Runoff
- Sediment
- Leachate Seeps

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2.3 General Response Actions

The RAOs can be achieved through a variety of approaches, referred to as GRAs. The following are potentially applicable GRAs. They can be used alone or in various combinations to achieve the RAOs:

- **No Action**

Under the no action GRA, the conditions of the contaminated media do not change. There is no additional or continued effort to physically restrict access to contaminated areas, reduce risks to human health, or be protective of human health and the environment.

- **Institutional Controls**

Institutional controls are methods that limit access to contaminated media, areas, or sites. Most institutional controls are in the form of deed notices or physical access restrictions, such as perimeter fencing. However, institutional controls can also include warning signs or more involved actions, such as zoning or other land-use restrictions. Also, by placing restrictions on land and on future construction activities, institutional controls may serve to preserve the effectiveness of a remedial action, assuming one is implemented.

Table 2-2
Medium-Specific RAOs for OU No. 3
RSR Corporation Superfund Site
Dallas, Texas

Soils (including landfill soils):

- Prevent direct contact with and ingestion of contaminated soil/slag/battery chips
- Meet the RCRA requirements for closure and remediation (30 T.A.C. §335.8).
- Meet the RCRA requirements for management and disposal of RCRA characteristic listed wastes (40 C.F.R. Part 268)

Surface Water/Stormwater Runoff:

- Manage stormwater quality through pollution prevention or best management practices in compliance with 40 C.F.R. Parts 122 and 125.

Sediment:

- Meet RCRA requirements for closure and remediation if the sediments are managed (30 T.A.C. §335.8)

Leachate Seeps:

- Prevent migration to surface waters

- **Containment**

Containment methods reduce or eliminate contaminant migration by use of physical barriers. Containment actions reduce contaminant migration by reducing the mobility of the contaminated media. Containment actions may also be applied to uncontaminated media to prevent migration of contamination if the uncontaminated media is contacting contamination and mobilizing it. Containment is also the presumptive remedy for municipal landfills.

- **Removal**

Removal activities involve the extraction and transfer of contaminated and associated uncontaminated materials from a site. Removal methods can be applied to soils, sediments, surface water, and debris. The methods can include excavation, debris removal, pumping, and dredging. However, excavation of landfills is typically limited to hot-spot removal due to the size and heterogeneity of the contents. For this FS, removal is assumed to be limited to those areas where target cleanup goals are exceeded.

- **Disposal**

Disposal activities involve the placement of contaminated material into a secure enclosure or approved disposal location. Disposal methods include landfills, disposal wells, and surface water discharges. The disposal GRA can be implemented both onsite and offsite and is typically used in conjunction with removal technologies.

- **Treatment**

Treatment provides a reduction or elimination of toxicity, mobility, or volume (TMV) of contamination. Treatment methods directly affect the contaminant by altering the chemical structure and completely destroying, bonding, or isolating the contaminant. Treatment can be implemented

onsite or offsite and include physical, chemical, biological, or thermal methods. When treating large volumes of low-level waste (e.g., municipal landfills), these technologies are often extremely expensive and/or difficult to implement.

- **Groundwater Control**

The function of a groundwater control system is to control seepage along the sideslopes of a landfill and to prevent discharges (seeps) to surface and groundwater systems. Common groundwater control systems include subsurface drains and vertical extraction wells.

- **Monitoring**

This action would be used in conjunction with all technologies. Three (3) main purposes are served. First, environmental monitoring during site remediation alerts cleanup personnel and residents of unacceptable exposure levels. Second, long-term monitoring following implementation of remedial actions is an effective way to determine whether or not the RAOs have been met. Finally, monitoring following remediation detects recontamination of remediated areas.

These GRAs encompass a broad range of remedial technologies and process options. Remedial technologies are methods for handling specific technical problems and are more specific than GRAs. **Table 2-3** provides a summary of the GRAs, remedial technologies, process options, and a brief description of process options that are applicable using the presumptive remedy approach for former landfills (Sites 3 and 4) at OU No. 3. Included in **Table 2-3** is an evaluation of the process option. Shaded processes have been retained for alternative development in **Section 3**.

The technologies and process options are evaluated based on their effectiveness, implementability, and cost. The effectiveness and implementability of each process option were evaluated to determine if the process option could potentially be combined into an alternative that could satisfy the RAOs. If the process option was determined to be not

Table 2-3
Screening of Technologies and Process Options for OU No. 3
RSR Corporation Superfund Site

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General Response Action	Remedial Technology	Process Option	Description	Evaluation	Screening Comments
No Action	None	None	None	Not effective. No reduction in TMV of contaminants. Implementable. No costs.	Retained as required by NCP
Institutional Controls	Access Restrictions	Fences/Warning Signs	Security fences installed around landfills and contaminated areas to limit access. Signs installed to warn of hazards.	Moderately effective in limiting direct human exposure by limiting access; no reduction in TMV of contaminants. May restrict future land use; commercially available. Implementable. Low capital and low operations and maintenance (O&M).	Retained
		Security	24-hour guard service/patrol	Moderately effective. Limits direct human exposure by limiting access; no reduction in TMV of contaminants. Implementable. Low capital and medium O&M.	Eliminated due to effectiveness and relative cost.
	Use Restrictions	Deed Restrictions	Deed notices issued for property within potentially contaminated areas for informational purposes. May require potential buyers to be notified of contamination. This information would be available to prospective land purchasers and lending institutions.	Limits direct human exposure by informing potential buyers of need for restricted future activities. Contamination remains with no reduction in TMV of contaminants. Effectiveness depends on continued future implementation. Negative public reaction resulting from perception of potential problems with future land use and sales of property. Deed notices and land use restrictions are difficult to obtain and enforce. Low capital and low O&M.	Retained
		Groundwater Restrictions	All deeds for property within potentially contaminated areas would include restrictions on development and domestic use of groundwater.	Moderately effective because shallow groundwater in the study area is not used as a potable water supply, nor is it expected to be used as a water supply in the future. Groundwater development ordinances and zoning restrictions have been implemented by the City of Dallas. Low capital and O&M.	Retained Current City Ordinances Apply
Containment	Capping (Cover)	Native Soil	Uncontaminated (clean) soil placed over contaminated areas.	Moderately effective in providing a barrier to direct contact of contaminants. Health risks and direct contact potential are reduced. Commercially available materials; installed with conventional methods. Requires long-term periodic maintenance. Implementable only where existing drainage patterns allow. Low to medium capital and O&M.	Retained
		Protective Composite Cap	Coarse-base grade layer, covered with a geotextile, followed by a protective soil/topsoil component. The geotextile would be of the heavyweight, nonwoven variety while the protective layer may include 18 inches of clean fill and 6 inches of topsoil to provide erosion control. The coarse-base grade is used to homogenize surface irregularities before placement of the remainder of the cap.	Effective in limiting direct human exposure to contamination; reduces infiltration into waste mass. Requires periodic long-term maintenance. Commercially available materials installed with conventional methods. Implementable only where existing surface conditions allow. Medium capital and low to medium O&M.	Retained

Note: Shading represents GRAs, remedial technologies, and process options that are retained for alternative development.

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Table 2-3
Screening of Technologies and Process Options for OU No. 3
RSR Corporation Superfund Site

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General Response Action	Remedial Technology	Process Option	Description	Evaluation	Screening Comments
		Composite (Multilayer) Barrier Cap	Compacted clay covered with a synthetic membrane (20 mil minimum) with additional protective fill above. The protective fill might include 12 inches of sand, 18 inches of general fill, and 6 inches of topsoil to provide erosion and moisture control and freeze-thaw protection. In addition, a base grade layer may be required for proper placement of the compacted clay.	Provides high level of protection from exposure due to direct contact. Also, this is the most effective capping option for reducing infiltration in compliance with RCRA guidance. Reduces mobility of contaminants but no reduction in toxicity or volume of contaminants. Susceptible to damage if digging/ trenching is allowed. Gas may build up below the barrier component thus cap must be used in conjunction with a gas venting system. This technology has been used successfully under similar conditions but is implementable only where current surface conditions allow. Requires long-term proactive management. Commercially available materials; installed with conventional methods. Large areal extent of soil contamination reduces implementability. Medium to high capital and medium O&M.	Retained
	Surface Controls	Grading	Reshaping of topography to manage infiltration and run-off and to control erosion.	Not effective in reducing toxicity or volume of contaminants and no reduction in human exposure. Moderately effective in controlling short- and long-term erosion. Implementable with conventional equipment. This process option is most effective when combined with other options such as capping. Low to medium capital and low O&M.	Retained
		Revegetation	A systematic revegetation plan includes selection of a suitable plant species, seedbed preparation, seed/planting, mulching, and/or chemical stabilization, fertilization, and maintenance. This technology may include hydroseeding.	Effectiveness depends upon vegetative viability. No reduction in TMV of contaminants. Implementable with conventional methods. Best used in combination with other process options such as capping. Low capital and O&M.	Retained
		Berms/Ditches/Swales	Surface features that control the location, collection, and movement of surface water.	Moderately effective in controlling short- and long-term erosion and in limiting infiltration. Mobility of contaminants is reduced but toxicity and volume remain unchanged. Implementable with conventional equipment. Potentially requires extensive regrading and relocation of landfill contents. Medium capital and low O&M.	Retained
		Ditch/Channel Protection	Placement of riprap, geosynthetics, concrete revetments, or similar materials to line and protect the slopes/banks of the streams, drainages, and channels.	Moderately effective in minimizing contact between surface waters and the contaminants thus reducing mobility of contaminants. Effective in reducing sideslope erosion. Extensive surface water drainages, sideslope instability, and surficial contamination at OU No. 3 make this option viable. Implementable with conventional equipment. Medium capital and low O&M.	Retained

Note: Shading represents GRAs, remedial technologies, and process options that are retained for alternative development.

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Table 2-3
Screening of Technologies and Process Options for OU No. 3
RSR Corporation Superfund Site

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General Response Action	Remedial Technology	Process Option	Description	Evaluation	Screening Comments
		Diversion	Rerouting of surface waters using extensive earthmoving and regrading equipment.	Moderately effective in preventing contact between surface waters and contaminants thus reducing mobility of contaminants. Extensive surface water features at OU No. 3 make this option potentially viable. Implementable with conventional equipment. Medium capital and O&M.	Retained
Removal	Excavation	Conventional Excavation	Use of mechanical excavation equipment to remove and load landfill wastes and/or contaminated soils for disposal. Backfill with clean local soil.	Effective long-term mitigation of threats to public health, welfare, and the environment. Volume of contaminants may increase due to soil bulking effects; may mobilize contaminants during operations and provide future exposure threat. Implementable. Proven full scale at hazardous waste sites; conventional methods utilized. High capital and low O&M.	Retained
		Dredging (sediments)	Use of mechanical excavation equipment to remove and load contaminated sediments for disposal.	Moderately effective in locations where sediments are a medium of concern. Reduction in the volume of contaminants. Potential migration of contaminants during excavation via surface water. Implementable with proven full-scale, commercially available equipment. High capital and low O&M.	Retained due to the large number of water bodies within OU No. 3.
	Disposal	Onsite Disposal	Relocate excavated waste that tests as RCRA nonhazardous to areas that will be capped under containment process options.	Effective for disposal of nonhazardous soil. Minimizes potential contaminant migration but no reduction in toxicity of contaminants. Applicable to nonhazardous waste only. Implementable with commercially available equipment; proven full-scale. Medium capital and low O&M.	Retained
		Offsite RCRA Subtitle D Landfill	Transportation and disposal of nonhazardous removed waste at a RCRA-approved landfill.	Effective. Elimination of potential contaminant migration but no reduction in toxicity of contaminants; may mobilize contaminants during transportation to landfill. Applicable to nonhazardous waste. Implementable. Conventional method for disposal; proven full-scale at hazardous waste sites. Medium capital and no O&M.	Retained
		Offsite RCRA Subtitle C Landfill	Transportation and disposal of removed RCRA characteristic wastes at a RCRA Subtitle C landfill.	Effective. Elimination of potential contaminant migration but no reduction in toxicity of contaminants; may mobilize contaminants during transportation to landfill. Applicable to hazardous waste. Implementable. Conventional method for disposal; proven full-scale at hazardous waste sites. High capital and no O&M.	Retained
Soil Treatment	Incineration	Rotary Kiln, Rotary Hearth, Fluidized Bed, Circulating Bed	Exposure of waste material to a high temperature for a specific period of time. Process produces innocuous substances such as carbon dioxide and water but also produces ash, oxides and acid gases.	Not effective for metals-contaminated soils. Some metals, such as lead, may volatilize. Implementable with commercially available equipment; proven full-scale. Relative cost not evaluated.	Eliminated based on effectiveness for metals-contaminated soils.

Note: Shading represents GRAs, remedial technologies, and process options that are retained for alternative development.

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Table 2-3
Screening of Technologies and Process Options for OU No. 3
RSR Corporation Superfund Site

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General Response Action	Remedial Technology	Process Option	Description	Evaluation	Screening Comments
		Molten Glass, Molten Salt	Exposure of waste material to high temperature mediums.	Not effective. Utilized for incineration of wastes with low ash content; not utilized nor applicable for soils. Relative cost not evaluated.	Eliminated based on effectiveness
		Slagging	Exposure of waste material to high temperature to melt ores and separate metals from them.	Moderately effective. Immobilization of inorganics in a vitrified mass; volatilization of some inorganics, such as lead, may occur due to high temperature. Implementable with commercially available equipment on a custom design basis. May generate high levels of NO _x . High capital and low O&M.	Eliminated based on cost due to the large volume of wastes.
	Pyrolysis	Conventional Reactor, Rotary Hearth, Ultra-High Temperature Reactor, Starved Air Combustion, Electric Reactor	Exposure of waste material to a high temperature for a specific period of time in the absence of oxygen.	Moderately effective when the process produces immobilized inorganics in a vitrified mass; volatilization of some inorganics, such as lead, may occur due to high temperature. Implementable to difficult to implement. High capital and O&M.	Eliminated based on implementability and cost.
	In-Situ Treatment	Solidification/Stabilization	Soil mixed with a pozzolanic/cement/proprietary material which can solidify and reduce mobility of contaminants.	Moderately effective for soils contaminated with inorganics and low concentrations of organics. Effective for reducing the mobility of inorganics; increase in volume; no reduction in toxicity of contaminants. Difficult to implement. Commercially available equipment and additives; delivery methods for in-situ mixing have been proven full-scale; large aerial extent of contaminated soils reduces implementability. Medium capital and O&M.	Eliminated based on limited implementability and large areal extent of contaminated soils.
		Biological Treatment	Soils seeded with microorganisms and nutrients to allow biological degradation.	Not effective. Process not effective for contaminants present in soil. Difficult to implement and maintain. Relative costs not evaluated.	Eliminated based on effectiveness and implementability
Groundwater Control	Collection	Extraction Wells	Series of wells used to extract groundwater in areas of concern such as the sideslopes.	Effective. May include perimeter extraction wells to minimize discharges (seeps) to surface water systems and to control sideslope instability issues. Implementable with conventional equipment and methods. Proven full-scale at hazardous waste sites. Low to medium capital and O&M.	Retained
		Subsurface Drains/Collection Trench	System of perforated pipe laid in trenches onsite to control groundwater and to lower groundwater table.	Effective. Could be used to control horizontal migration of both groundwater and landfill gas. Implementable with conventional equipment and methods. Proven full scale at hazardous waste sites. Medium capital and high O&M.	Retained

Note: Shading represents GRAs, remedial technologies, and process options that are retained for alternative development.

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Table 2-3
Screening of Technologies and Process Options for OU No. 3
RSR Corporation Superfund Site

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General Response Action	Remedial Technology	Process Option	Description	Evaluation	Screening Comments
Monitoring	Monitoring	Air Monitoring	Sampling and analysis of air for contaminant concentrations.	Effective in assessing the effectiveness of remedial actions. No reduction in TMV of contaminants.	Retained
		Surface Water Monitoring	Sampling and analysis of surface water for contaminant concentrations.	This technology has been successfully used under similar conditions. Implementable and commercially available. Low capital and low O&M.	
		Groundwater Monitoring	Sampling and analysis of groundwater for contaminant concentrations.		

Note: Shading represents GRAs, remedial technologies, and process options that are retained for alternative development.

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effective or not implementable, it was eliminated from further evaluations.

Under the effectiveness evaluation, process options can be determined to be effective, moderately effective, or not effective as follows:

- **Effective**—Process options determined to be effective are applicable to specific site conditions, the media, and at least one (1) of the contaminants present in the media. Effective process options are also able to successfully address at least a portion of the contamination present onsite.
- **Moderately Effective**—Moderately effective process options describe technologies that when implemented may not be completely successful either alone or in combination with other process options in meeting the RAO for one or more of the contaminants, do not reduce toxicity or volume of contamination, do not reduce human exposure, or could potentially produce toxic byproducts. In addition, specific site conditions (i.e., low-permeability soils) may inhibit the effectiveness of a process option.
- **Not Effective**—Process options that are not effective are those that do not apply to site conditions, media, contaminants present, contaminant concentrations, nature and extent of contamination, or site characteristics.

Under the implementability evaluation, process options could be determined to be implementable, difficult to implement, or not implementable. Each of these are discussed as follows:

- **Implementable**—Process options have been determined to be implementable if the equipment, supplies, and technical expertise are commercially available. An implementable process option also has been proven full-scale or appears likely to be successful based on bench/pilot scale studies.
- **Difficult to Implement**—Process options identified as having difficult implementation are those that have not been proven full scale but have been

demonstrated on a pilot scale. Also, equipment or technical expertise is not commercially available, or operating conditions are difficult to maintain.

- **Not Implementable**—Process options identified as being not implementable are those that may not be commercially available, have not been demonstrated at full- or bench-scale level, or operating conditions are impossible to maintain.

Relative cost information was identified for process options that were either effective or moderately effective and implementable. The cost information identifies the relative magnitude of the capital expenditure and annual operating costs associated with the process option relative to other process options within a response action group. Cost information was not used to eliminate any technologies or process options, rather it has been used to help select representative process options.

Table 2-4 provides a summary of the retained processes.

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Table 2-4
Retained Technologies and Process Options
for OU No. 3, RSR Corporation Superfund Site

General Response Actions	Remedial Technology	Process Option
No Action	None	None
Institutional Controls	Access Restrictions	Fences and Warning Signs
	Use Restrictions	Deed Restrictions
		Groundwater Restrictions
Containment	Capping/Cover	Native Soil
		Protective Composite Cap
		Composite (Multilayer) Barrier Cap
	Surface Controls	Grading
		Revegetation
		Berms/Ditches/Swales
		Ditch/Channel Protection
Removal	Excavation	Diversion
		Conventional Excavation
	Disposal	Dredging (Sediments)
		Onsite Disposal
		Offsite RCRA Subtitle D Landfill
Groundwater Control	Collection	Offsite RCRA Subtitle C Landfill
		Extraction Wells
		Subsurface Drains/Collection Trench
Monitoring	Monitoring	Air Monitoring
		Surface Water Monitoring
		Groundwater Monitoring

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Section 3
Development and Screening of Alternatives

Section 3

Development and Screening of Alternatives

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Section 2 identified and screened technologies and process options that were potentially applicable to OU No. 3 contaminated media. Those technologies and process options that were retained after the screening process (See **Table 2-4**) can now be selected for use in remedial alternatives developed in this section. Alternatives have been developed by assembling combinations of the GRAs, technologies, and representative process options into OU-specific alternatives that represent a range of treatment and/or containment options. Process options are selected based on a combination of effectiveness and professional judgement. The most effective process options are retained for the selection of a site remedy.

Alternatives that are retained after the screening process performed in this section will be evaluated in detail in **Section 4**. Alternatives are presented separately for Sites 1, 3, and 4. Sites are evaluated separately because of the geographic separation between sites and because Site 1 is not a former landfill, as are Sites 3 and 4.

3.1 Development of Alternatives

The remedial technologies and process options retained up to this point are building blocks that can be put together to form a variety of remedial alternatives. The primary goal of each alternative is to attain the RAOs for the site. The alternatives developed for Sites 3 and 4 also address the primary RAOs stated in the EPA's *Guidance on Presumptive Remedy for CERCLA Municipal Landfill Sites (EPA, 1993a)*:

- Preventing direct contact with landfill contents
- Minimizing infiltration and resulting contaminant leaching to groundwater
- Controlling surface water runoff and erosion
- Controlling landfill gas

In addition, the development of alternatives considered the following suggestions from the NCP and the *Guidance for Conducting Remedial Investigation and Feasibility Studies Under CERCLA* (EPA, 1988):

- To include treatments that permanently reduce the TMV of contaminants. That is, the range of treatment alternatives developed should, if possible, vary in the degree of reliance on long-term management of untreated wastes
- To include permanent solutions to the maximum extent practicable
- To include innovative treatment technologies and/or resource recovery technologies to the maximum extent practicable
- To include one or more containment alternatives that involve little or no treatment of hazardous contaminants
- To include a No Action Alternative

CERCLA requires that treatment alternatives and permanent solutions be emphasized whenever possible (CERCLA 121(b)(1)). However, EPA has recognized that treatment alternatives may be prohibitively expensive at sites that involve large quantities of low-level contaminated wastes, such as municipal landfills and metals refining sites. For such sites, it is often not possible to develop a complete range of applicable alternatives that satisfies the above criteria. The retained process options from **Table 2-4** were combined to assemble an initial set of remedial alternatives. **Tables 3-1, 3-2 and 3-3** illustrate how the individual process options were combined to develop each of the initial remedial alternative sets for Sites 1, 3, and 4. These remedial alternatives are described in the following section.

Table 3-1
Remedial Action Alternatives for OU No. 3 - Site 1
RSR Corporation Superfund Site

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Alternative	General Response Action(s)	Process Option(s)	Description
<u>Alternative 1a</u>	No Action	None	Required by NCP to be carried through detailed analysis of alternatives. No remedial action will be implemented.
<u>Alternative 1b</u>	Institutional Controls and Monitoring	Access and Use Restrictions; Surface Water Monitoring	<p>Deed notices and restrictions limiting the use of land and groundwater. This alternative also includes fencing and warning signs.</p> <p>Annual monitoring for a 5-year period of two (2) surface water monitoring locations along the intermittent creek for TAL metals.</p>
<u>Alternative 2</u>	Removal, Offsite Disposal, and Monitoring	Excavation, Dredging, Grading, Offsite Disposal, Revegetation, and Surface Water Monitoring	<p>Clear, heavy vegetation from bank slope. A selective removal action will remove (1) slag piles, surficial slag deposits and battery casing chips, and related metals contaminated soils; (2) large slag pieces found in open concrete drainage channel; and (3) all tire piles and drums from the intermittent creek bed. Excavate 18 inches of smelter-related wastes and metals-contaminated soil from areas exceeding target cleanup goals. Excavations will be backfilled and regraded using conventional equipment and clean soil. Excavated materials exceeding TCLP criteria will be transported to and disposed of in a RCRA Class C landfill facility. Excavated soil that is not RCRA characteristic will be disposed of in a nonhazardous waste landfill. Disturbed areas will be revegetated with native grasses.</p> <p>Excavate 18 inches of sediments from the intermittent creek bed in areas exceeding target cleanup goals. For material exceeding TCLP criteria, disposal will be to a RCRA Class C landfill facility.</p> <p>Annual monitoring for a 5-year period of two (2) surface water monitoring locations along the intermittent creek for TAL metals.</p>
<u>Alternative 3</u>	Containment, Removal, and Monitoring	Excavation, Grading, Protective Cover, Revegetation, and Surface Water Monitoring	<p>Place a protective cap in the fenced area. Surface preparation will consist of clearing and regrading the slope to a uniform grade. The cap will consist of a coarse-base grade; a heavyweight, nonwoven geotextile; and a 24 inch protective/topsoil cover. The cap will be vegetated with native grasses and will be maintained for a period of 30 years.</p> <p>Excavate 12 inches of smelter-related wastes and metals-contaminated soil from areas exceeding target cleanup goals outside of the containment area. Excavations will be backfilled and regraded using conventional equipment and clean soil. Excavated materials will be tested for TCLP characteristics and will be transported to and disposed of in the appropriate landfill facility.</p>

<p>Table 3-1 Remedial Action Alternatives for OU No. 3 - Site 1 RSR Corporation Superfund Site</p> <p>Page 2 of 2</p>			
Alternative	General Response Action(s)	Process Option(s)	Description
			<p>Excavate 18 inches of sediments from the intermittent creek bed in areas exceeding target cleanup goals. For material exceeding TCLP criteria, disposal will be to a RCRA Class C landfill facility.</p> <p>Annual monitoring for a 5-year period of two (2) surface water monitoring locations along the intermittent creek for TAL metals.</p>
<u>Alternative 4</u>	Removal, Containment, and Monitoring	Excavation, Grading, Protective Cover, Revegetation, and Surface Water Monitoring	<p>Cap the fenced area with a composite cover. Surface preparation will consist of clearing and regrading the slope to the open concrete drainage channel. The composite cap will include a coarse-base grade; a heavyweight, nonwoven geotextile; 24 inches of compacted clay; an FML; a lightweight, nonwoven geotextile; a sand drain; and a topsoil/protective layer. The cap will be vegetated with native grasses and will be maintained for a period of 30 years.</p> <p>Excavate 12 inches of smelter-related wastes and metals-contaminated soil from areas exceeding target cleanup goals outside of the containment area. Excavations will be backfilled and regraded using conventional equipment and clean soil. Excavated materials will be tested for TCLP characteristics and will be transported to and disposed of in the appropriate landfill facility.</p> <p>Excavate 18 inches of sediments from the intermittent creek bed in areas exceeding target cleanup goals. For material exceeding TCLP criteria, disposal will be to a RCRA Class C landfill facility.</p> <p>Annual monitoring for a 5-year period of two (2) surface water monitoring locations along the intermittent creek for TAL metals.</p>

Table 3-2
Remedial Action Alternatives for OU No. 3 - Site 3
RSR Corporation Superfund Site

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Alternative	General Response Action(s)	Process Option(s)	Description
<u>Alternative 1a</u>	No Action	None	Required by NCP to be carried through detailed analysis of alternatives. No remedial action will be implemented.
<u>Alternative 1b</u>	Institutional Controls and Monitoring	Access and Use Restrictions; Groundwater and Surface Water	<p>Deed notices and restrictions limiting the use of land and groundwater. This alternative also includes fencing and warning signs</p> <p>Annual monitoring for a 5-year period of four (4) existing groundwater monitoring wells and four (4) surface water locations along Mountain Creek Diversion Channel and associated drainages to this channel for TAL metals.</p>
<u>Alternative 2</u>	Removal and Monitoring	Excavation, Offsite Disposal, Grading, Revegetation, and Groundwater and Surface Water Monitoring	<p>Excavate 12 inches of surficial battery casings/chips, slag, and related metals-contaminated soil from the West Davis (both cells) Landfills. Excavated RCRA characteristic soils will be transported to an offsite RCRA Subtitle C landfill for disposal. Excavated soil that is not RCRA characteristic will be disposed of in a nonhazardous waste landfill. Excavations will be backfilled, compacted, and regraded using conventional methods and clean soil. Disturbed areas will be revegetated with native grasses.</p> <p>Annual monitoring for a 5-year period of four (4) existing groundwater monitoring wells and four (4) surface water locations along Mountain Creek Diversion Channel and associated drainages to this channel for TAL metals.</p>
<u>Alternative 3</u>	Removal, Containment, and Monitoring	Excavation, Onsite Disposal, Revegetation, Capping, and Groundwater and Surface Water Monitoring	<p>Surficial battery casings/chips, slag, and metals-contaminated soil exceeding target cleanup goals will be excavated and, if tested nonhazardous, will be replaced on the surface of the southern portion of West Davis Landfill where it will be spread and covered. The isolated areas of excavation will be backfilled, compacted, and regraded with clean soil.</p> <p>A protective soil cap will be placed over the southern portion of West Davis Landfill where there are several exceedances of target cleanup goals. The protective cap will consist of a coarse-base grade; a heavyweight, nonwoven geotextile; and a 24-inch protective/topsoil layer. The protective cap of this alternative will be vegetated with native grasses and will be maintained for a period of 30 years.</p>

Table 3-2 Remedial Action Alternatives for OU No. 3 - Site 3 RSR Corporation Superfund Site			
		Page 2 of 2	
Alternative	General Response Action(s)	Process Option(s)	Description
Alternative 3 (cont.)			Annual monitoring for a 5-year period of four (4) existing groundwater monitoring wells and four (4) surface water locations along Mountain Creek Diversion Channel and associated drainages to this channel for TAL metals.
<u>Alternative 4</u>	Containment, Removal, Groundwater Control, and Monitoring	Grading, Revegetation, Ditch/Channel Protection, Excavation, Capping, Diversion Swales, Subsurface Drains, and Groundwater and Surface Water Monitoring	<p>Clear and regrade the following landfill slopes: the western slopes of TXI and West Davis Landfills, southern TXI Landfill, northern and southern West Davis Northern Cell, and northern West Davis Southern Cell. A protective soil layer cover consisting of a coarse-base grade; a heavyweight, nonwoven geotextile; and a 24-inch protective/topsoil cover will be applied. The entire slopes will be revegetated with appropriate native grasses. The vegetation will be supported by an erosion mat covering the length of the slopes. Excess material resulting from grading to be spread and regraded on existing landfill surface.</p> <p>Surficial excavation of smelter-related waste exceeding target cleanup goals located outside of capped areas will be relocated to areas that will be capped.</p> <p>Cap TXI Landfill and both cells of the West Davis Landfill in their entirety. Surface preparation will consist of clearing, and regrading the landfill surface to a 2 percent slope draining to the existing drainage channels. The composite cap will include a coarse-gas venting layer; a heavyweight, nonwoven geotextile; 24-inches of compacted clay; an FML; a drainage layer; and a topsoil/protective layer. This alternative includes surface regrading, transporting clay soils, compaction, revegetation, and long-term cover maintenance (for a period of 30 years).</p> <p>Construct a vegetated surface swale through the northern third of TXI Landfill. The swale will collect and transport surface water flow generated from the Dahlstrom and TXI Landfills. The swale will be graded to flow and discharge to the Mountain Creek Diversion Channel.</p>

<p style="text-align: center;">Table 3-3 Remedial Action Alternatives for OU No. 3 - Site 4 RSR Corporation Superfund Site</p> <p style="text-align: right;">Page 1 of 2</p>			
Alternative	General Response Action(s)	Process Option(s)	Description
<u>Alternative 1a</u>	No Action	No Action	Required by NCP to be carried through detailed analysis of alternatives. No remedial action will be implemented.
<u>Alternative 1b</u>	Institutional Controls and Monitoring	Access and Use Restrictions; Groundwater and Surface Water Monitoring	<p>Deed notices and restrictions limiting the use of land and groundwater. This alternative also includes fencing and warning signs.</p> <p>Annual monitoring for a 5-year period of three (3) existing groundwater monitoring wells and two (2) surface water locations on the Old Trinity River Channel. Samples will be analyzed for TAL metals.</p>
<u>Alternative 2</u>	Removal and Monitoring	Excavation, Offsite Disposal, Grading, Revegetation, and Groundwater and Surface Water Monitoring	<p>Excavate 12 inches of surficial battery casing chips, slag, and related metals-contaminated soil in the West Dallas and Nomas Landfills and Jaycee Park. Excavation will be performed using conventional methods. RCRA characteristic soils will be transported to an offsite RCRA Subtitle C landfill for disposal. Excavated soil that is not RCRA characteristic will be disposed of in a nonhazardous waste landfill. Excavations will be backfilled, regraded, and compacted using conventional methods and clean soil. Disturbed areas will be revegetated with native grasses.</p> <p>Annual monitoring for a 5-year period of three (3) existing groundwater monitoring wells and two (2) surface water locations on the Old Trinity River Channel. Samples will be analyzed for TAL metals.</p>
<u>Alternative 3</u>	Removal, Containment, and Monitoring	Excavation, Capping, Grading, Revegetation, and Groundwater and Surface Water Monitoring	<p>Excavate soils from Jaycee Park that exceed target cleanup levels and relocate to the West Dallas Landfill (assuming TCLP testing indicates non-hazardous materials). Also, the isolated slag on West Dallas Landfill will be relocated to the West Dallas Landfill area that will be capped. Excavated areas will be backfilled and regraded using conventional equipment and clean soil.</p> <p>A protective soil cap will be placed over portions of West Dallas and Nomas Landfills with exposed battery casing chips, slag, and related metals-contaminated soil. The cap will also cover the relocated soil and slag from Jaycee Park and other isolated areas. The protective cap will consist of a coarse-base grade; a heavyweight, nonwoven geotextile; and a 24-inch protective/topsoil layer. The protective cap will be vegetated with native grasses and will be maintained for a period of 30 years.</p> <p>Annual monitoring for a 5-year period of three (3) existing groundwater monitoring wells and two (2) surface water locations on the Old Trinity River Channel. Samples will be analyzed for TAL metals.</p>

Table 3-3
Remedial Action Alternatives for OU No. 3 - Site 4
RSR Corporation Superfund Site

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Alternative	General Response Action(s)	Process Option(s)	Description
<u>Alternative 4</u>	Removal, Containment, and Monitoring	Excavation, Capping, Grading, Revegetation, and Groundwater and Surface Water Monitoring	<p>Excavate soils that exceed target cleanup levels from Jaycee Park and relocate to the West Dallas Landfill (assuming TCLP testing indicates non-hazardous materials). Also, the isolated slag on West Dallas Landfill will be relocated to the West Dallas Landfill area that will be capped. Excavated areas will be backfilled and regraded using conventional equipment and clean soil.</p> <p>A composite soil cap will be placed over portions of West Dallas and Nomas Landfill. The composite cap will consist of a coarse-base grade; a heavyweight, nonwoven geotextile; 24-inches of compacted clay; an FML; a lightweight, nonwoven geotextile; a sand drain; and a 24-inch protective/topsoil component. The cap will be vegetated with native grasses and will be maintained for a period of 30 years.</p> <p>Annual monitoring for a 5-year period of three (3) existing groundwater monitoring wells and two (2) surface water locations on the Old Trinity River Channel. Samples will be analyzed for TAL metals.</p>

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3.2 Remedial Alternatives

This section presents the remedial alternatives developed for each site on OU No. 3. The remedial alternatives have been developed separately for Sites 1, 3, and 4 and were summarized in **Tables 3-1, 3-2, and 3-3**.

Alternatives and components of alternatives for each site were based on areas that exceeded target cleanup goals, TCLP results, and other RAOs as appropriate. The various alternatives are shown in the figures in this section summarizing the information used in developing alternatives. Also included in the figures is a schematic representation of smelter-related surficial contamination as delineated in the RI (EPAc, 1995). The components included in each alternative are also included in the figures.

3.2.1 Site 1

Five (5) alternatives for Site 1 have been developed and include a range of alternatives using no action, institutional controls, monitoring, removal, and containment GRAs.

Figures 3-1 and 3-2 summarize various components of the alternatives.

3.2.1.1 Site 1 Alternative No. 1a: No Action

Evaluation of the No Action Alternative is required by Section 300.430(e)(3)(ii)(6) of the NCP, 40 C.F.R. §300 and is used as a baseline against which other alternatives are evaluated. Under this alternative, no remedial action would be undertaken to treat, contain, or remove contaminated media on Site 1. No institutional or operational controls would be implemented to restrict access to Site 1, or to restrict exposure to contaminants. Monitoring would not be a component of this alternative.

3.2.1.2 Site 1 Alternative No. 1b: Institutional Controls and Monitoring

3.2.1.2.1 Institutional Controls. Institutional controls are non-engineering methods to prevent or limit access and exposure to contaminated media on Site 1. This alternative includes deed notices and restrictions that limit the use of the land and warn potential buyers and lenders of the presence of contamination. Such deed notices and land use

restriction may be difficult to obtain and enforce and may meet with substantial opposition from many different sources. In addition, this alternative includes the construction of approximately 1,000-linear feet of security fencing and the posting of warning signs within Site 1 (**Figure 3-1**).

3.2.1.2.2. Monitoring. This portion of Alternative 1b includes a 5-year monitoring program for the surface water in OU No. 3 Site 1. Surface water will be monitored annually at two (2) locations along the intermittent creek. Included in this alternative is the cost associated with analyzing the surface water samples for TAL metals. At the 5-year review, the monitoring program could be discontinued, reauthorized, or modified as appropriate. For costing purposes, only the 5-year monitoring program is included.

3.2.1.3 Site 1 Alternative No. 2: Removal and Monitoring

3.2.1.3.1 Conventional Excavation. To gain access to the slag, battery casing chip piles, and metals-contaminated soil within the fenced area of Site 1, 3.0 acres of the heavily vegetated slope/bank will be cleared with conventional equipment. As indicated in the RI, surficial slag deposits, battery casing chips, and metals-contaminated soil extend to a depth of 0 to 2 feet within the southern two-thirds of the fenced area (extending north of the Trailer Park Property limits to the open concrete drainage channel location). Under this alternative, 18 inches of surficial slag, battery casing chips, and metals-contaminated soil will be excavated from locations that show evidence of smelter-related dumping and/or where target cleanup goals are exceeded (**Figure 3-1**). The underlying soil will be analyzed for levels of contamination present. If smelter-related wastes persist, or the remaining soil tests above target cleanup goals, an additional 12 inches of soil will be excavated. Based on information in the RI, it is assumed that approximately 50 percent of excavated areas will require 24 inches of excavation, whereas the remaining 50 percent will require 12 inches of excavation. For cost estimating purposes, it is assumed that 78,960 square feet of slag, battery casing chips, and metals-contaminated soil will be excavated with conventional equipment. This calculates to approximately 4,390 cubic yards of excavated soil.

Excavated soil will be temporarily stored onsite for TCLP analysis. For cost estimating purposes, it has been assumed that 18 samples will be collected and analyzed for TCLP

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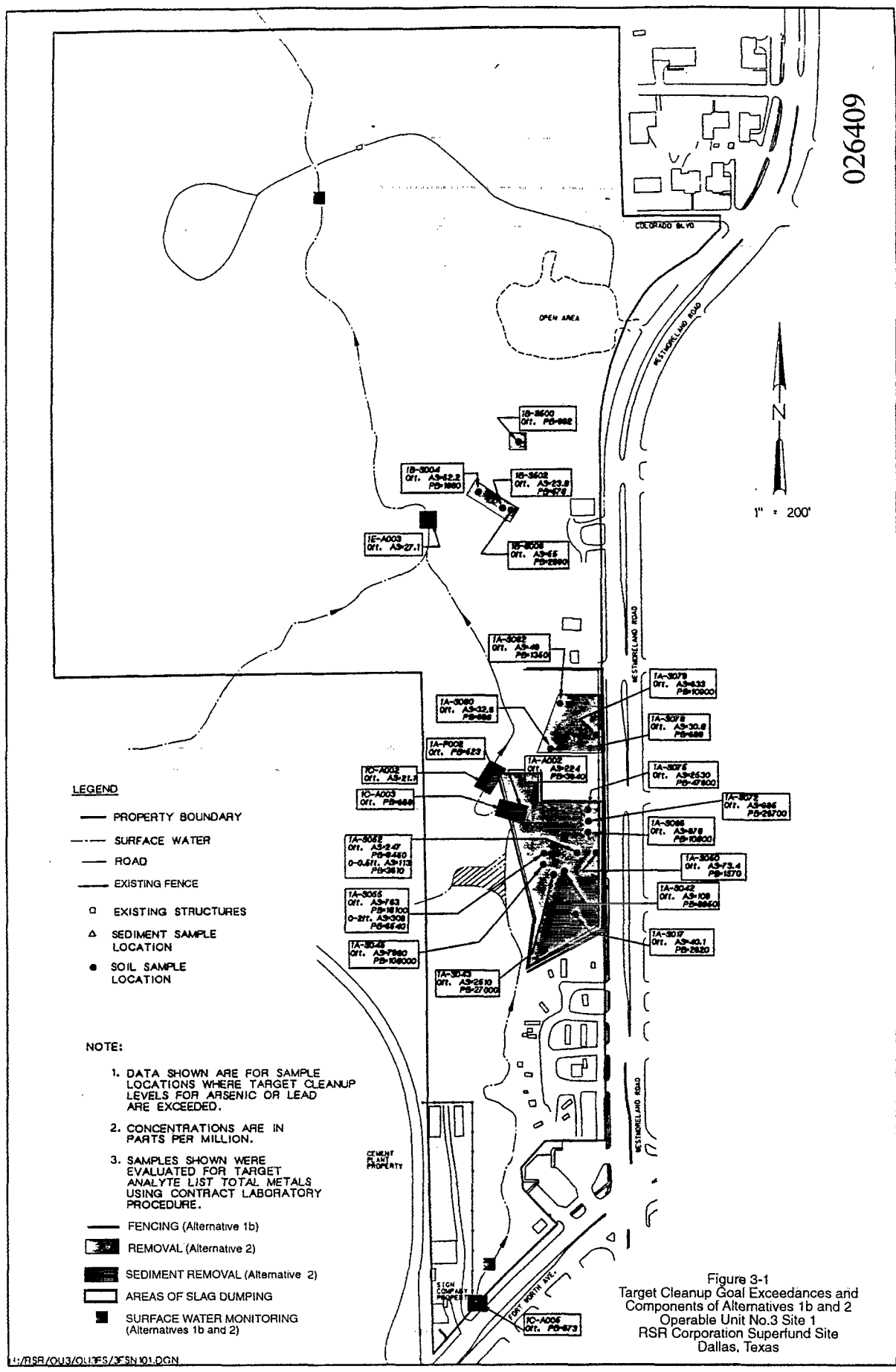


Figure 3-1
Target Cleanup Goal Exceedances and
Components of Alternatives 1b and 2
Operable Unit No.3 Site 1
RSR Corporation Superfund Site
Dallas, Texas

and TAL metals. A maximum of 20 percent of the removed soil is assumed to meet the characteristics of a hazardous waste and will be transported to a RCRA Subtitle C landfill. The remaining soil will be disposed of as nonhazardous waste. Excavations will be backfilled and regraded with clean soil using conventional equipment.

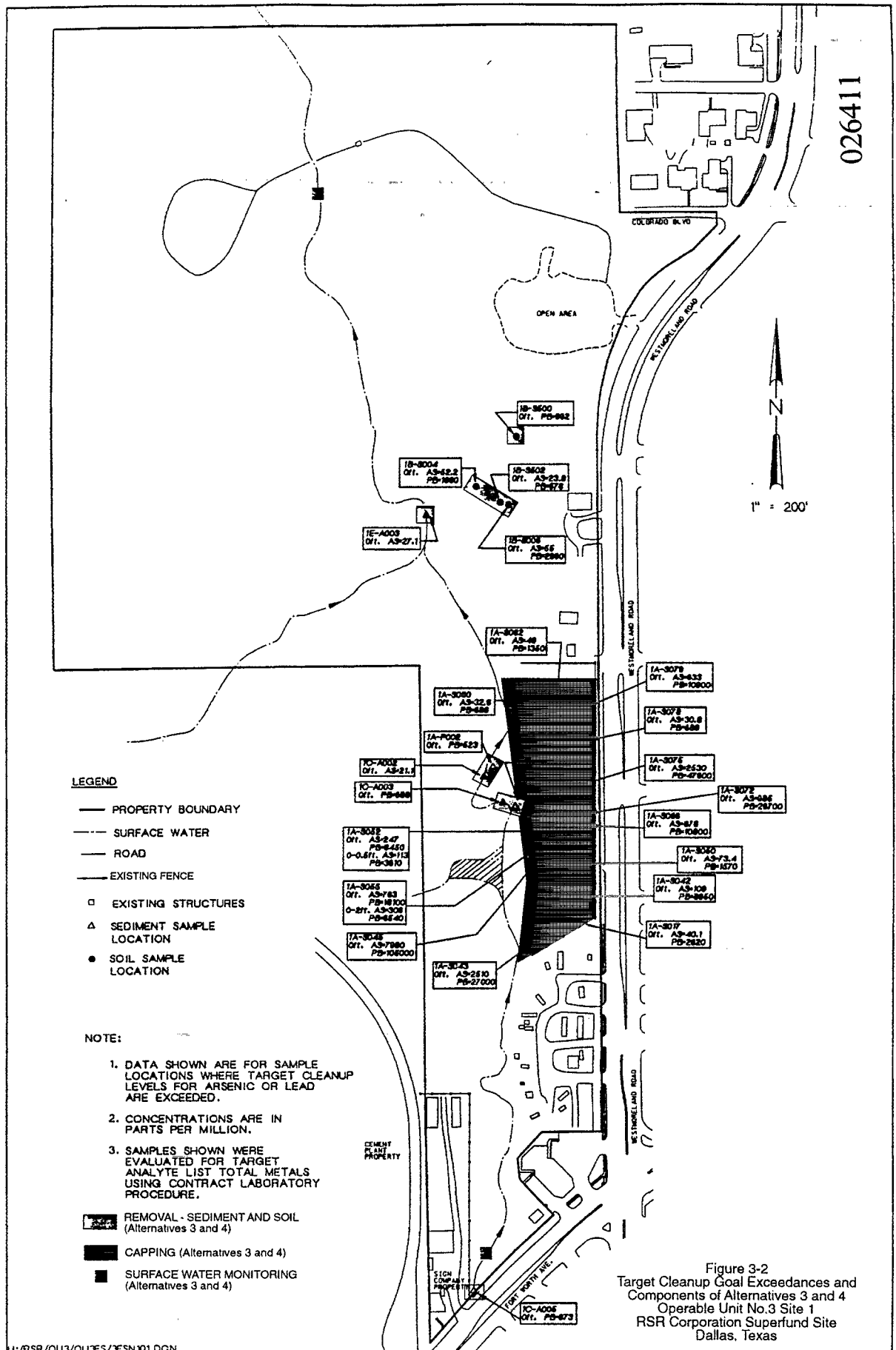
The concrete and limestone debris piles located in the central portion of the fenced area will be excavated and regraded within the limits of the southern excavation area. For cost estimating purposes, it is assumed that slag and battery casing chips do not exist below the limits of the removed concrete and limestone debris piles. If slag and battery casing chips are unearthed in this section, they will be excavated and disposed of accordingly. This alternative includes the removal of approximately 200 used tires and 15 degraded, empty 55-gallon drums of unknown original composition.

3.2.1.3.2 Sediment Removal. This alternative includes the removal of the top 18 inches of sediments from the channel of the intermittent creek in areas exceeding target cleanup goals (**Figure 3-1**). This alternative will result in 380 cubic yards of contaminated sediments. Conventional shore-based dredging equipment (e.g., backhoe or clamshell) is to be used. Sediments exceeding TCLP requirements will be transported to an offsite RCRA Class C landfill for disposal. For cost estimating purposes, it has been assumed that 2 samples will be collected and analyzed for TCLP and TAL metals. For cost estimating purposes, 20 percent of the excavated sediments has been assumed to exceed TCLP requirements.

3.2.1.3.3 Monitoring. Same as Site 1 Alternative No. 1b.

3.2.1.4 Site 1 Alternative No. 3: Protective Cap, Removal, and Monitoring

3.2.1.4.1 Protective Cap. This containment alternative includes placing a protective soil cap over the exposed battery casing chips, slag, and metals-contaminated soils within the fenced area of Site 1 (**Figure 3-2**). This 102,300 square foot area is currently covered with heavy vegetation, debris piles, and an irregular slope leading to the intermittent creek. A complete cover/capping design plan will address surface preparation prior to the installation of the cap. Surface preparation will consist of clearing and regrading the hillside to a uniform slope.



A protective cover consisting of a coarse-base grade; a heavyweight, nonwoven geotextile; and a 24-inch protective/topsoil cover will be placed on the regraded slope. The cap will be vegetated with appropriate native grasses and maintained for a period of 30 years. Surface preparation will be performed using conventional earthmoving equipment and methods. In addition, this alternative assumes the placement of the cap layers will be performed using conventional methods and that the cover soils will be locally obtained.

3.2.1.4.2 Conventional Excavation. This removal alternative is similar to Alternative No. 2 except that excavation will be limited to those areas that exceed TCLs outside of the containment area (**Figure 3-2**). It is assumed that 12 inches of surficial slag, battery casing chips, and metals-contaminated soil will be excavated from these locations. This calculates to 140 cubic yards of excavated soil. Based on information in the RI, it is assumed that this removed material will test as nonhazardous waste and will be disposed of accordingly.

3.2.1.4.3 Sediment Removal. Same as Site 1 Alternative No. 2.

3.2.1.4.4 Monitoring. Same as Site 1 Alternative No. 1b. This alternative also includes annual inspection of cap.

3.2.1.5 Site 1 Alternative No. 4: Composite Cap, Removal, and Monitoring

3.2.1.5.1 Composite Cap. This containment alternative is similar to the containment portion of Alternative No. 3 except that a composite barrier cap will be constructed over the 102,300-square-foot area of concern (**Figure 3-2**). Among the capping options, a composite barrier cap provides maximum protection from exposure due to direct contact and is most effective for reducing infiltration thus limiting contaminant mobility. Components of the composite cover will include a coarse-base grade; a heavyweight, nonwoven geotextile; 24 inches of compacted clay; a flexible membrane liner (FML); a drainage layer; a lightweight geotextile; and a 24-inch protective/topsoil cover. The cap will be vegetated with appropriate native grasses and will be maintained for a period of 30 years. This alternative assumes that surface preparation will be performed using conventional earthmoving equipment and methods. In addition, this alternative assumes

the placement of the cap layers will be performed using conventional methods and that the cover soils will be locally obtained.

3.2.1.5.2 Conventional Excavation. Same as Site 1 Alternative No. 3.

3.2.1.5.3 Sediment Removal. Same as Site 1 Alternative No. 3.

3.2.1.5.4 Monitoring. Same as Site 1 Alternative No. 1b.

3.2.2 Site 3

Five (5) alternatives for Site 3 have been developed that include a range of alternatives using no action, institutional controls, removal, groundwater control, and containment GRAs. **Figures 3-3 and 3-4** summarize various components of the alternatives.

3.2.2.1 Site 3 Alternative No. 1a: No Action

Evaluation of the No Action Alternative is required by Section 300.430(e)(3)(ii)(6) of the NCP, 40 C.F.R. §300 and is used as a baseline against which other alternatives are evaluated. Under this alternative, no remedial action would be undertaken to treat, contain, or remove contaminated media on Site 3. No institutional or operational controls would be implemented to restrict access to Site 3, or to restrict exposure to contaminants. Monitoring would not be a component of this alternative.

3.2.2.2 Site 3 Alternative No. 1b: Institutional Controls and Monitoring

3.2.2.2.1 Institutional Controls. Institutional controls are nonengineering methods that prevent or limit access and exposure to contaminated media on Site 3. This alternative includes deed notices and restrictions that limit the use of the land and warn potential buyers and lenders of the presence of contamination. Such deed notices and land use restrictions may be difficult to obtain and enforce and may meet with substantial opposition from different sources. In addition, this alternative includes the placement of approximately 4,500 linear feet of security fencing (10 feet high, galvanized with three strands of barbed wire) along the eastern and southern boundaries of TXI and West Davis

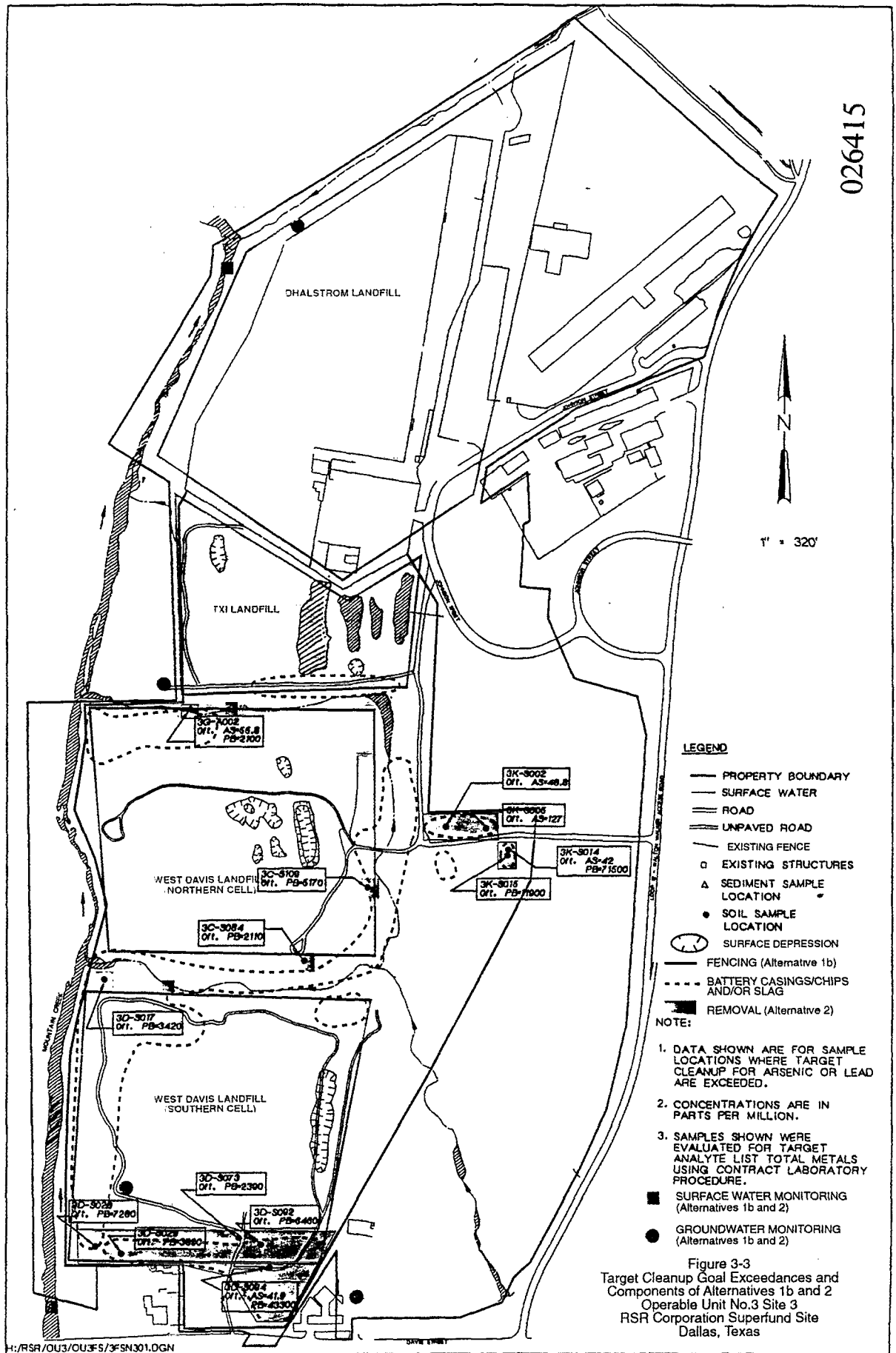
Landfills, placement of approximately 3,200-linear feet of boundary fencing (5 feet high and galvanized) along the western boundary of TXI and West Davis Landfills, and the posting of warning signs within Site 3 (**Figure 3-3**).

3.2.2.2.2 Monitoring. This portion of Alternative No. 1b includes a 5-year monitoring program for the groundwater and surface water on OU No. 3 Site 3. The groundwater will be monitored annually at four (4) existing wells used in the RI, including two (2) wells upgradient and two (2) wells downgradient of the landfills. Surface water will be monitored annually at two (2) locations along the Mountain Creek Diversion Channel and two (2) locations in drainages feeding this channel. Included in this alternative is the cost associated with analyzing the groundwater and surface water samples for TAL metals. At the 5-year review, the monitoring program could be discontinued, reauthorized, or modified as appropriate. For costing purposes, the 5-year monitoring program is included.

3.2.2.3 Site 3 Alternative No. 2: Removal and Monitoring

3.2.2.3.1 Removal. Under this alternative, 12 inches of surficial battery casing chips, slag, and related metals-contaminated soil will be excavated from locations where the RI indicates target cleanup goal exceedance (**Figure 3-3**). The underlying soil will be analyzed for levels of contamination. If the remaining soil tests above the action levels for lead, antimony, or arsenic, an additional 12 inches of soil will be removed. Excavated soils would be temporarily stored onsite for TCLP analysis to determine if the soils test as RCRA characteristic. For cost estimating purposes, it has been assumed that 30 samples will be collected and analyzed for TCLP and TAL metals.

A maximum of 10 percent of the removed soil is assumed to meet the characteristics of a hazardous waste. Soils determined to be noncharacteristic will be shipped to a RCRA nonhazardous waste facility. For those soils determined to be hazardous, shipment will be to a RCRA Subtitle C landfill. Excavations will be backfilled and regraded with clean soil using conventional methods followed by revegetation with native grasses. For the purposes of cost estimating, it is assumed that 166,500 square feet of battery casing chips,



slag, and related metals-contaminated wastes will be removed to an average depth of 12 inches. This calculates to approximately 6,165 cubic yards of excavated soil. Under this alternative, 175,000 square feet would be cleared in preparation for the removal action.

3.2.2.3.2 Monitoring. Same as Site 3 Alternative No. 1b.

3.2.2.4 Site 3 Alternative No. 3: Excavation, Containment, and Monitoring

3.2.2.4.1 Excavation and Containment. This alternative includes surficial excavation of isolated areas of smelter-related contamination and relocation to the southern portion of the West Davis Landfill that will be capped. It is estimated that approximately 892 cubic yards of soil will be excavated, relocated, and regraded within the limits of Site 3. Excavated areas will be backfilled, compacted, and regraded using conventional equipment and clean soil.

A protective soil cap will be placed over the southern portion of the West Davis Landfill where there is exposed slag and battery chip and several soil samples exceeding target cleanup goals. A complete cover/capping design plan will address surface preparation prior to the installation of the protective soil cap. It is assumed that approximately 275,000 square feet will be cleared and regraded prior to the installation of the cover in the southern portion of the West Davis Landfill. The area to be capped is shown in **Figure 3-4** and comprises an area of 262,700 square feet. The protective cap will consist of a coarse-base grade; a heavyweight, nonwoven geotextile; and a 24-inch protective/topsoil cover. The cap will be vegetated with appropriate native grasses and will be maintained for a period of 30 years.

A complete cover/capping design plan will address surface preparation prior to the installation of the protective soil cap. It is assumed that approximately 1,000,000 square feet will be cleared and regraded prior to the installation of the cover. The area to be capped is shown in **Figure 3-4** and comprises an area of 740,000 square feet. The protective cap will be graded for surface water to flow to the existing drainage channels and will consist of a coarse-base grade; a heavyweight, nonwoven geotextile; and a 24-inch protective/topsoil cover. The cap will be vegetated with appropriate native grasses and will be maintained for a period of 30 years.

This alternative assumes that surface preparation will be performed using conventional earthmoving equipment and methods. In addition, this alternative assumes the placement of the cap layers will be performed using conventional methods and that the cover soils will be locally obtained.

3.2.2.4.2 Monitoring. Same as Site 3 Alternative No. 1b. In addition, annual inspection of cap is included.

3.2.2.5 Site 3 Alternative No. 4: Ditch/Channel Protection, Containment, Excavation, Surface Controls, and Monitoring

3.2.2.5.1 Ditch/Channel Protection. This portion of Alternative No. 4 includes clearing and regrading the following landfill slopes (**See Figure 3-5**): (1) western slopes of TXI, and West Davis Landfills, (2) southern slope of TXI landfill, (3) northern and southern slopes of the West Davis Northern Landfill Cell, and (4) the northern slope of the West Davis Southern Landfill Cell. Excavated soils derived from this regrading effort, including battery casings, slag, and related metals-contaminated soil casings, will be placed and regraded on the surfaces of TXI and West Davis Landfills, which will be covered as part of this alternative (**Section 3.2.2.5.2**). A protective soil layer cover, consisting of a coarse-base grade; a heavyweight, nonwoven geotextile; and a 24-inch protective/topsoil cover, will be applied. These slopes will be revegetated with native grasses that will be supported by erosion mats covering the full length of the slopes. Slope cover maintenance will continue for a period of 30 years.

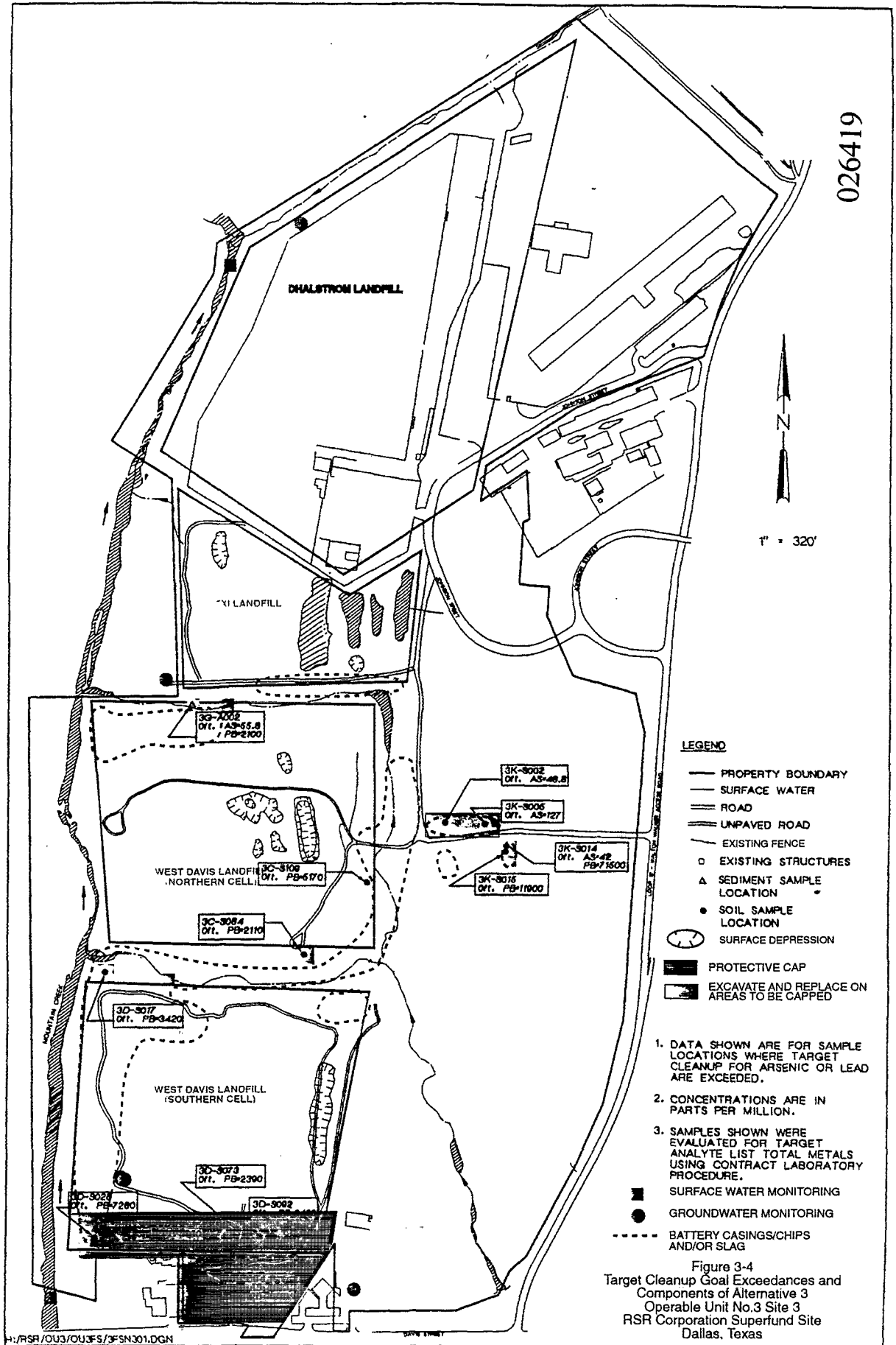
This alternative assumes that surface preparation will be performed using conventional earthmoving equipment and methods. In addition, this alternative assumes the placement of the cap layers will be performed using conventional methods and that the cover soils will be locally obtained.

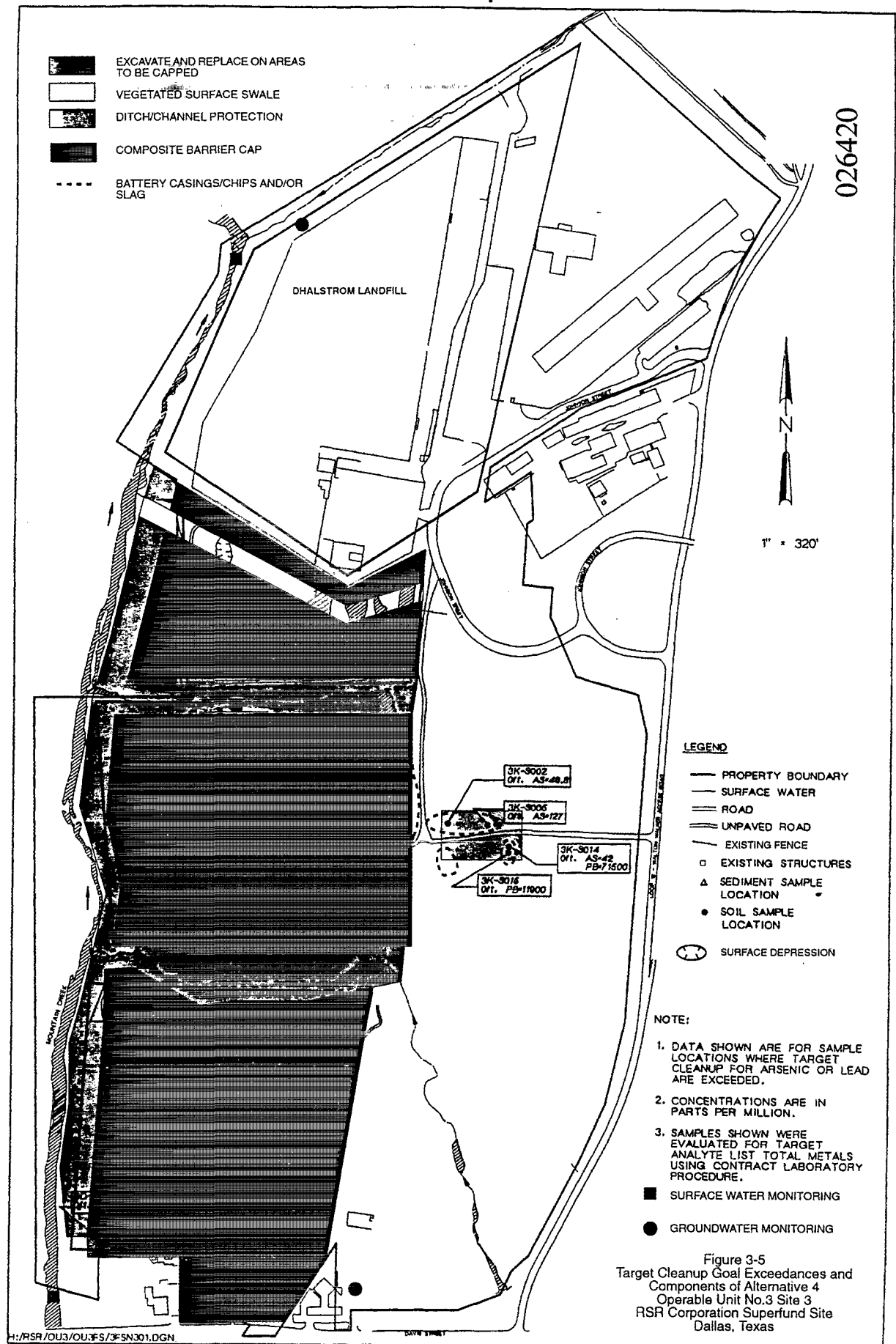
3.2.2.4.2 Monitoring. Same as Site 3 Alternative No. 1b. In addition, annual inspection of cap is included.

3.2.2.5 Site 3 Alternative No. 4: Ditch/Channel Protection, Containment, Excavation, Surface Controls, and Monitoring

3.2.2.5.1 Ditch/Channel Protection. This portion of Alternative No. 4 includes clearing and regrading the following landfill slopes (See Figure 3-5): (1) western slopes of TXI, and West Davis Landfills, (2) southern slope of TXI landfill, (3) northern and southern slopes of the West Davis Northern Landfill Cell, and (4) the northern slope of the West Davis Southern Landfill Cell. Excavated soils derived from this regrading effort, including battery casings, slag, and related metals-contaminated soil casings, will be placed and regraded on the surfaces of TXI and West Davis Landfills, which will be covered as part of this alternative (Section 3.2.2.5.2). A protective soil layer cover, consisting of a coarse-base grade; a heavyweight, nonwoven geotextile; and a 24-inch protective/topsoil cover, will be applied. These slopes will be revegetated with native grasses that will be supported by erosion mats covering the full length of the slopes. Slope cover maintenance will continue for a period of 30 years.

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3.2.2.5.2 Containment and Excavation. This containment alternative includes placing an engineered barrier cap on the TXI Landfill and the West Davis landfill cells (**Figure 3-5**). Dahlstrom Landfill is not included with this alternative because a capping system currently exists. The estimated aerial extent of this capping alternative is 2,520,000 square feet. Currently, these landfills are covered with vegetation and irregular topography. This alternative includes a complete landfill capping design plan that will address surface preparation prior to installation of the cap.

This alternative includes surficial excavation of an isolated area of smelter-related contamination and relocation to areas that will be capped. It is estimated that approximately 1,570 cubic yards of soil will be excavated, relocated, and regraded. The excavated area will be backfilled, compacted, and regraded using conventional equipment and clean soil.

The composite barrier cap will consist of a gas venting base grade; a heavyweight, nonwoven geotextile; 24 inches of compacted clay; an FML; a drainage layer; a lightweight, nonwoven geotextile; and a 24-inch protective/topsoil cover. The cap will be vegetated with appropriate native grasses and will be maintained for a period of 30 years. This alternative assumes that surface preparation will be performed using conventional earthmoving equipment and methods. In addition, this alternative assumes that placement of the cap components will be performed using conventional methods and that cover soils will be locally obtained.

3.2.2.5.3 Surface Controls. Included in this alternative is the construction of a vegetated surface swale through the northern third of TXI Landfill. The swale will collect and transport surface water flow generated from the Dahlstrom and TXI Landfills. The surface swale will be constructed with 3 to 1 slopes and will be 5 feet in depth. The base of the swale will consist of 2 feet of compacted clay, a 40 mil FML, 2 feet of a vegetated protective cover, and an erosion mat. The swale will be graded to flow and discharge to the Mountain Creek Diversion Channel. The swale will be constructed on top of the nonwoven geotextile component of the landfill cap. This alternative assumes the placement of the compacted-clay layer; the protective layer will be performed using conventional methods and the appropriate clay soil will be locally obtained.

3.2.2.5.4 Groundwater Control. A system of subsurface drains will be installed in conjunction with the sideslope protective covers between TXI and West Davis Landfills and between the two cells of the West Davis Landfill. The function of the subsurface drains is to minimize sideslope discharges (seeps) and to control sideslope stability issues.

3.2.2.5.5 Monitoring. Same as Site 3 Alternative No. 3.

3.2.3 Site 4

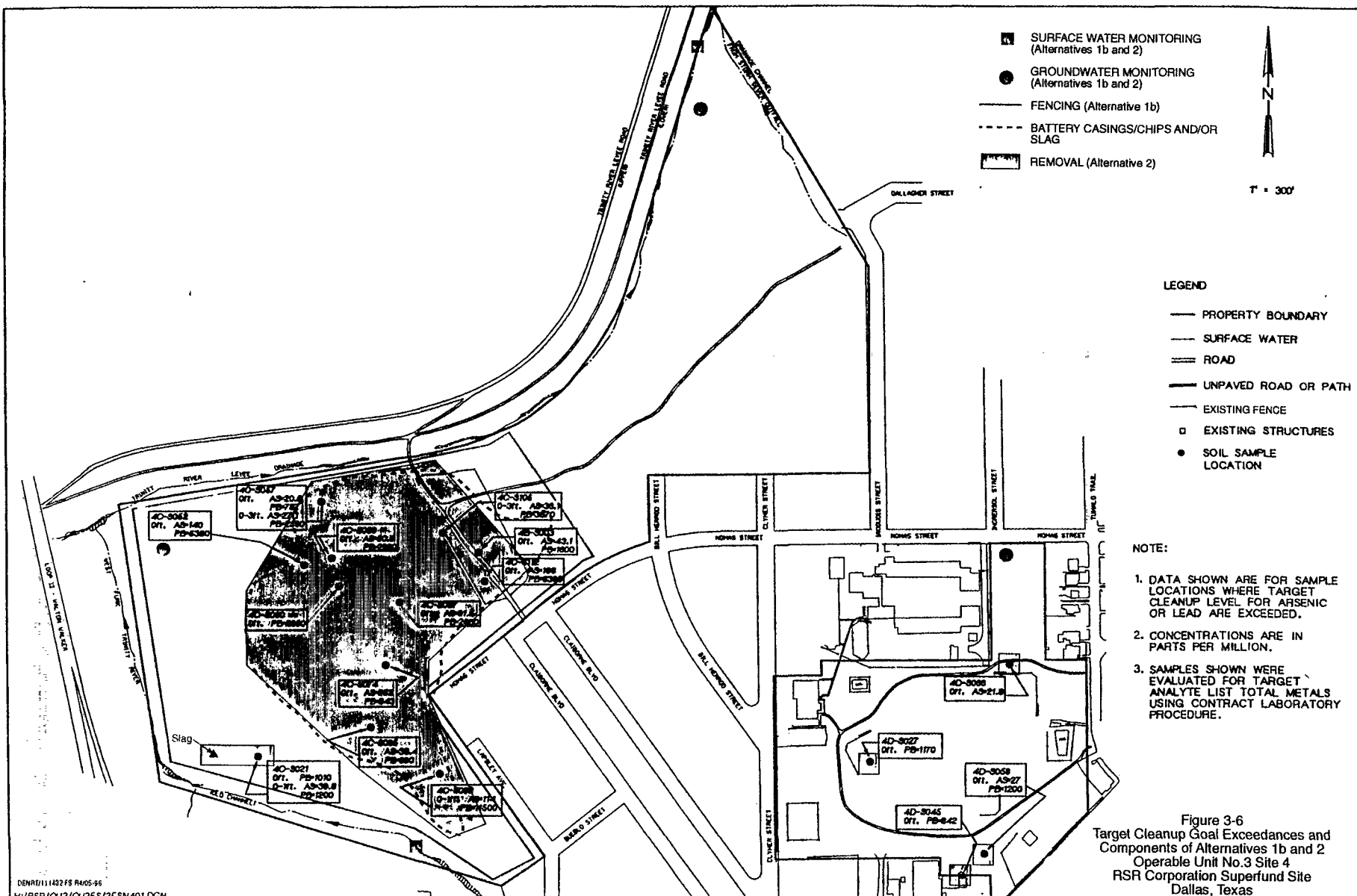
Five alternatives have been developed for Site 4 that include a range of alternatives using no action, institutional controls, removal, and containment GRAs. **Figures 3-6 and 3-7** summarize various components of the alternatives.

3.2.3.1 Site 4 Alternative No. 1a: No Action

Evaluation of the No Action Alternative is required by Section 300.430(e)(3)(ii)(6) of the NCP, 40 C.F.R. §300, and is used as a baseline against which other alternatives are evaluated. Under this alternatives, no remedial action would be undertaken to treat, contain, or remove contaminated media on Site 4. No institutional or operational controls would be implemented to restrict access to Site 4, or to restrict exposure to contaminants. Monitoring would not be a component of this alternative.

3.2.3.2 Site 4 Alternative No. 1b: Institutional Controls and Monitoring

3.2.3.2.1 Institutional Controls. Institutional controls are non-engineering methods to prevent or limit access and exposure to contaminated media on Site 4. This alternative includes deed notices and restrictions that limit the use of the land and warn potential buyers and lenders of the presence of contamination. Such deed notices and land use restrictions may be difficult to obtain and enforce and may meet with substantial opposition from many different sources. In addition, this alternative includes the placement of (1) 4,100 linear feet of security fencing around the southern and western perimeter of West Dallas, Nomas, and Vilbig Landfills, (2) 1,350 linear feet of boundary fencing along the northwestern perimeter, and (3) the posting of warning signs (**Figure 3-6**).



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3.2.3.2.2 Monitoring. This portion of Alternative No. 1b includes a 5-year monitoring program for the groundwater and surface water in OU No. 3 Site 4. The groundwater will be monitored annually at three (3) existing wells used in the RI, including one (1) well upgradient and two (2) wells downgradient of the landfills. Surface water will be monitored annually at two (2) surface water locations along the Old Trinity River Channel. Included in this alternative is the cost associated with analyzing the groundwater and surface water samples for TAL metals. At the 5-year review, the monitoring program could be discontinued, reauthorized, or modified as appropriate. For costing purposes, only the 5-year monitoring program is included.

3.2.3.3 Site 4 Alternative No. 2: Removal and Monitoring

3.2.3.3.1 Removal. Under this alternative, 12 inches of surficial battery casing chips, slag, and related metals-contaminated soil will be excavated from the West Davis and Nomas Landfills and Jaycee Park where the RI delineates surficial smelter-related wastes and/or target cleanup goal exceedance (**Figure 3-6**). The underlying soil will be analyzed for levels of contamination present. If the remaining soil tests above the action levels for lead or arsenic, an additional 12 inches of soil would be removed.

Excavated soils would be temporarily stored onsite for analysis to determine if the soils display TCLP hazardous characteristics. For cost estimating purposes, it has been assumed that 100 samples will be collected and analyzed for TCLP and TAL metals. Soils determined to be noncharacteristic will be shipped to a nonhazardous disposal facility. For those soils determined to be hazardous, shipment will be to a RCRA Subtitle C landfill. Excavations will be backfilled, regraded, and compacted using conventional methods and clean soil. A maximum of 10 percent of the removed soil is assumed to meet the characteristics of hazardous waste. Based on site reconnaissance and sampling, it is assumed that 706,270 square feet of battery casing chips, slag, and related metals-contaminated wastes will be removed to an average depth of 12 inches. This calculates to approximately 26,160 cubic yards of excavated soil.

3.2.3.3.2 Monitoring. Same as Site 4 Alternative No. 1b.

3.2.3.4 Site 4 Alternative No. 3: Protective Cap, Removal, and Monitoring

3.2.3.4.1 Protective Cap and Removal. To limit direct human exposure to smelter-related contamination within Site 4, a protective soil cap will be placed over those areas within Nomas and West Dallas Landfills with exposed battery casing chips, slag, and related metals-contaminated soil (**Figure 3-7**). This alternative includes surficial excavation of isolated areas in Jaycee Park and Vilbig Landfill with target cleanup goal exceedances. Based on results in the RI (**EPA, 1995c**), it is assumed that 100 percent of the excavated soil will not test as TCLP hazardous and will be transported to the West Dallas Landfill to be spread and graded in locations where the protective cover will be placed (**Figure 3-7**). If excavated soil tests as TCLP hazardous, it will be transported to a RCRA Subtitle C landfill. For cost estimating purposes, it has been assumed that 2 samples will be collected and analyzed for TCLP and TAL metals.

A capping design plan will address surface preparation prior to the installation of the protective soil cap. It is assumed that 904,300 square feet of Nomas and West Dallas Landfills will be cleared of the current relatively sparse vegetation. The area to be capped is shown in **Figure 3-7** and comprises an area of 904,300 square feet. The protective cap will be graded for surface water to flow to the existing drainage channels and will consist of a coarse-base grade; a heavyweight, nonwoven geotextile; and a 24-inch protective/topsoil cover. The cap will be vegetated with appropriate native grasses and will be maintained for a period of 30 years.

This alternative assumes that surface preparation will be performed using conventional earthmoving equipment and methods. In addition, this alternative assumes the placement of the cap layers will be performed using conventional methods and that the appropriate soils will be locally obtained.

3.2.3.4.2 Monitoring. Same as Site 4 Alternative No. 1b. Annual inspection of cap is also included.

3.2.3.5 Site 4 Alternative No. 4: Composite Cap, Removal, and Monitoring

3.2.3.5.1 Composite Cap and Removal. Similar to Alternative 3 except that portions of West Dallas and Nomas Landfills will be covered with a composite barrier cap (Figure 3-7). Among capping options, a composite barrier cap provides maximum protection from exposure due to direct contact and is more effective for reducing infiltration into the landfill/soil mass. Components of the composite cover will include a gas-collection layer; a heavyweight, nonwoven geotextile; 24 inches of compacted clay; an FML; a drainage layer; a lightweight, nonwoven geotextile; and a 24-inch protective/topsoil cover. Because gas may build up below the barrier components, this alternative includes a nominal passive gas venting system. The cap will be vegetated with native grasses and will be maintained for a period of 30 years. This alternative assumes that surface preparation will be performed using conventional earthmoving equipment and methods. In addition, placement of the cap layers will be performed using conventional methods and the appropriate soils will be locally obtained. As in Alternative No. 3, the isolated excavated areas will be backfilled and regraded with clean soils.

3.2.3.5.2 Monitoring. Same as Site 4 Alternative No. 3.

3.3 Screening of Alternatives

Tables 3-4, 3-5, and 3-6 present the screening of Alternatives Nos. 1 through 4 for OU No. 3 Sites 1, 3, and 4. The alternatives were evaluated on the basis of effectiveness, implementability, and relative costs. The primary focus of the screening step was effectiveness, with less concern placed on implementability and relative costs. The objective of the screening stage is to further define the alternatives and eliminate those alternatives found to be ineffective, not implementable, and/or prohibitively costly.

Effectiveness pertains to:

- The degree of protection of human health, the environment, and workers during implementation
- The ability of the technology to comply with ARARs and to meet the RAOs

- The expected reliability and performance of the alternative with respect to site contaminants and conditions at the site

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Evaluation of implementability addresses both the technical and administrative feasibility of implementing the technology. Implementability pertains to:

- The ability of necessary resources or supplies
- The availability to construct and operate a technology with demonstrated performance and useful life
- The availability and capacity of offsite treatment and disposal facilities

Relative costs will be used to screen out alternatives only if the cost is believed to be significantly higher while effectiveness or implementability are not significantly different. The cost estimates include general capital and operation and maintenance (O&M) costs.

Based on this evaluation, all alternatives were retained for detailed analysis except Alternative No. 4 for Site 3. This alternative was eliminated because of high costs and relatively minor difference in effectiveness and implementability.

Table 3-4
Screening of Alternatives - OU No. 3 Site 1
RSR Corporation Superfund Site

Page 1 of 2

Alternative	Effectiveness	Implementability	Cost (\$)
Alternative No. 1a	Advantages	Advantages	Capital: \$0
No Action	<ul style="list-style-type: none"> • Not Applicable 	<ul style="list-style-type: none"> • Implementable 	O&M: \$0
	Disadvantages	Disadvantages	Present Worth: \$0
	<ul style="list-style-type: none"> • No reduction in toxicity, mobility, or volume of contaminants • No reduction in human exposure to contaminants 	<ul style="list-style-type: none"> • Not Applicable 	
Conclusions - This alternative does not meet RAOs for soils, surface water/storm water runoff, sediment, or leachate seeps. This alternative is implementable and incurs no cost. Based on the NCP, this alternative is retained			
Alternative No. 1b	Advantages	Advantages	Capital: \$99,040
Institutional Controls and Monitoring	<ul style="list-style-type: none"> • Limits site access and community exposure 	<ul style="list-style-type: none"> • Implementable 	O&M: \$2,580
	Disadvantages	Disadvantages	Present Worth: \$110,210
	<ul style="list-style-type: none"> • Restricts future land use • No reduction in toxicity, mobility, or volume of contaminants 	<ul style="list-style-type: none"> • May be difficult to implement and enforce 	
Conclusions - This alternative does not meet most RAOs. However, to preserve a range of alternatives, this alternative is retained.			
Alternative No. 2	Advantages	Advantages	Capital: \$1,503,490
Removal and Monitoring	<ul style="list-style-type: none"> • Eliminates human exposure to metals-contaminated soils • Reduces mobility of residual contamination • Contamination source for stormwater and surface water removed 	<ul style="list-style-type: none"> • Implementable • Equipment and materials commercially available • Methods proven full scale at hazardous waste sites • No long-term maintenance 	Annual O&M: \$2,580
	Disadvantages	Disadvantages	Present Worth: \$1,514,660
	<ul style="list-style-type: none"> • Increase in volume of contaminants due to soil bulking effects 	<ul style="list-style-type: none"> • May mobilize contaminants during excavation of soils 	
Conclusions - This alternative meets RAOs for soils and sediments and most of the RAOs for surface water/storm water runoff and leachate seeps. This alternative is implementable; however, capital costs are high. Based on effectiveness and implementability, this alternative is retained.			

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Table 3-4
Screening of Alternatives - OU No. 3 Site 1
RSR Corporation Superfund Site

Page 2 of 2

Alternative	Effectiveness	Implementability	Cost (\$)
Alternative No. 3 Protective Cap, Removal, and Monitoring	Advantages	Advantages	Capital: \$671,880
	<ul style="list-style-type: none"> • Reduces potential for direct exposure to metals-contaminated soils • Reduces infiltration into waste mass 	<ul style="list-style-type: none"> • Equipment and materials commercially available • Methods proven full scale at hazardous waste sites 	O&M: \$3,530
	Disadvantages	Disadvantages	Present Worth: \$726,140
	<ul style="list-style-type: none"> • No reduction in toxicity or volume of metals-contaminated soils • Restricts future land use 	<ul style="list-style-type: none"> • Periodic long-term maintenance of protective soil cover required • Potential mobilization of contaminants during regrading and application of protective soil cover • May be difficult to implement with current topography and bedrock conditions 	
Conclusions - This alternative meets RAOs for soils and sediments and some of the RAOs for surface water/storm water runoff and leachate seeps.			
Alternative No. 4 Composite Cap, Removal, and Monitoring	Advantages	Advantages	Capital: \$1,161,670
	<ul style="list-style-type: none"> • Provides maximum protection from exposure due to direct contact • Most effective capping option for reducing infiltration in compliance with RCRA guidance • Moderately effective in locations where sediments are a medium of concern • Prevents contact between surface waters and contaminants thus reducing mobility of contaminants 	<ul style="list-style-type: none"> • Equipment and materials commercially available • Methods proven full scale at hazardous waste sites 	O&M: \$3,530
	Disadvantages	Disadvantages	Present Worth: \$1,215,930
	<ul style="list-style-type: none"> • No reduction in toxicity or volume of metals-contaminated soils • Restricts future land use • Potential migration of contaminants during excavation and construction via surface water 	<ul style="list-style-type: none"> • Long-term maintenance of composite cover required • Potential mobilization of contaminants during regrading and application of composite cover • May be difficult to implement with current topography and bedrock conditions • Restricts future land use 	
Conclusions - This alternative meets RAOs for soils, surface water/stormwater runoff, sediment, and leachate seeps. This alternative provides more protection than Alternative No. 3 but at higher costs. This alternative is implementable; however, long-term maintenance is required. Based on effectiveness and implementability, this alternative is retained.			

026430

Table 3-5
Screening of Alternatives - OU No. 3 Site 3
RSR Corporation Superfund Site

Page 1 of 3

Alternative	Effectiveness	Implementability	Cost (\$)
Alternative No. 1a	Advantages	Advantages	Capital: \$0
No Action	<ul style="list-style-type: none"> • Not Applicable 	<ul style="list-style-type: none"> • Implementable 	O&M: \$0
	Disadvantages	Disadvantages	Present Worth: \$0
	<ul style="list-style-type: none"> • No reduction in toxicity, mobility, or volume of contaminants • No reduction in human exposure to contaminants 	<ul style="list-style-type: none"> • Not Applicable 	
Conclusions - This alternative does not meet RAOs for soils, surface water/storm water runoff, sediment, or leachate seeps. This alternative is implementable and incurs no cost. Based on the NCP, this alternative is retained.			
Alternative No. 1b	Advantages	Advantages	Capital: \$344,350
Institutional Controls and Monitoring	<ul style="list-style-type: none"> • Limits site access and community exposure 	<ul style="list-style-type: none"> • Implementable 	O&M: \$6,530
	Disadvantages	Disadvantages	Present Worth: \$372,620
	<ul style="list-style-type: none"> • Restricts future land use • No reduction in toxicity, mobility, or volume of contaminants 	<ul style="list-style-type: none"> • May be difficult to implement and enforce 	
Conclusions - This alternative does not meet most RAOs. However, to preserve a range of alternatives, this alternative is retained.			
Alternative No. 2	Advantages	Advantages	Capital: \$1,620,810
Removal and Monitoring	<ul style="list-style-type: none"> • Eliminates exposure to metals-contaminated soils • Reduces mobility of residual contamination • Smelter-related contamination source for stormwater and surface water removed 	<ul style="list-style-type: none"> • Equipment and materials commercially available • Methods proven full scale at hazardous waste sites • No long-term maintenance 	Annual O&M: \$6,540
	Disadvantages	Disadvantages	Present Worth: \$1,649,120
	<ul style="list-style-type: none"> • Increase in volume of contaminants due to soil bulking effects 	<ul style="list-style-type: none"> • May mobilize contaminants during excavation of soils 	
Conclusions - This alternative meets RAOs for soils and some of the RAOs for surface water/storm water runoff and leachate seeps. This alternative is implementable; however, capital costs are high. Based on effectiveness and implementability, this alternative is retained.			

026431

Table 3-5
Screening of Alternatives - OU No. 3 Site 3
RSR Corporation Superfund Site

Page 2 of 3

Alternative	Effectiveness	Implementability	Cost (\$)
Alternative No. 3	Advantages	Advantages	Capital: \$1,175,610
Excavation, Containment, and Monitoring	<ul style="list-style-type: none"> Reduces potential for direct exposure to metals-contaminated soils Reduces infiltration into areas exposed to smelter-related contamination 	<ul style="list-style-type: none"> Equipment and materials commercially available Methods proven full scale at hazardous waste sites 	O&M: \$4,490
	Disadvantages	Disadvantages	Present Worth: \$1,244,630
	<ul style="list-style-type: none"> No reduction in toxicity or volume of metals-contaminated soils and landfill contents Does not address leachate seeps and gas migration issues outside of areas of smelter-related contamination 	<ul style="list-style-type: none"> Periodic long-term maintenance of protective soil cover required Potential mobilization of contaminants during excavating, regrading and application of soil covers Long-term monitoring required 	
Conclusions - This alternative meets RAOs for soils and some of the RAOs for surface water/storm water runoff and leachate seeps. This alternative is implementable; however, long-term maintenance is required. Based on effectiveness and implementability, this alternative is retained.			
Alternative No. 4	Advantages	Advantages	Capital: \$24,062,910
Ditch/Channel Protection, Containment, Excavation, Surface Controls, and Monitoring	<ul style="list-style-type: none"> Provides maximum protection from exposure due to direct contact Most effective capping option for reducing infiltration in compliance with RCRA guidance Moderately effective in locations where sediments are a medium of concern Addresses leachate seeps and gas migration issues outside of areas of smelter-related contamination Prevents contact between surface waters and contaminants thus reducing mobility of contaminants 	<ul style="list-style-type: none"> Equipment and materials commercially available Methods proven full scale at hazardous waste sites 	O&M: \$7,520
			Present Worth: \$24,178,500

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Table 3-5
Screening of Alternatives - OU No. 3 Site 3
RSR Corporation Superfund Site

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Alternative	Effectiveness	Implementability	Cost (\$)
	Disadvantages <ul style="list-style-type: none"> • No reduction in toxicity or volume of metals-contaminated soils • Restricts future land use • Potential migration of contaminants during excavation and construction via surface water 	Disadvantages <ul style="list-style-type: none"> • Long-term maintenance of composite cover required • Potential mobilization of contaminants during regrading and application of composite cover • May be difficult to implement with current topography and bedrock conditions • Restricts future land use • Long-term monitoring required 	

Conclusions: This alternative meets RAOs; however, due to high cost and little difference in effectiveness and implementability, this alternative is not retained.

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Table 3-6
Screening of Alternatives - OU No. 3 Site 4
RSR Corporation Superfund Site

Page 1 of 2

Alternative	Effectiveness	Implementability	Cost (\$)
Alternative No. 1a	Advantages	Advantages	Capital: \$0
No Action	<ul style="list-style-type: none"> • Not Applicable 	<ul style="list-style-type: none"> • Implementable 	O&M: \$0
	Disadvantages	Disadvantages	Present Worth: \$0
	<ul style="list-style-type: none"> • No reduction in toxicity, mobility, or volume of contaminants • No reduction in human exposure to contaminants 	<ul style="list-style-type: none"> • Not Applicable 	
Conclusions - This alternative does not meet RAOs for soils, surface water/storm water runoff, or leachate seeps. This alternative is implementable and incurs no cost. Based on the NCP, this alternative is retained			
Alternative No. 1b	Advantages	Advantages	Capital: \$311,260
Institutional Controls and Monitoring	<ul style="list-style-type: none"> • Limits site access and community exposure 	<ul style="list-style-type: none"> • Implementable 	O&M: \$4,230
	Disadvantages	Disadvantages	Present Worth: \$329,570
	<ul style="list-style-type: none"> • Restricts future land use • No reduction in toxicity, mobility, or volume of contaminants 	<ul style="list-style-type: none"> • May be difficult to implement and enforce 	
Conclusions - This alternative does not meet most RAOs. However, to preserve a range of alternatives, this alternative is retained.			
Alternative No. 2	Advantages	Advantages	Capital: \$5,958,810
Removal and Monitoring	<ul style="list-style-type: none"> • Eliminates exposure to metals-contaminated soils • Reduces mobility of residual contamination 	<ul style="list-style-type: none"> • Equipment and materials commercially available • Methods proven full scale at hazardous waste sites • No long-term maintenance 	Annual O&M: \$4,230
	Disadvantages	Disadvantages	Present Worth: \$5,977,120
	<ul style="list-style-type: none"> • Increase in volume of contaminants due to soil bulking effects 	<ul style="list-style-type: none"> • May mobilize contaminants during excavation of soils 	
Conclusions - This alternative meets RAOs for soils and some of the RAOs for surface water/storm water runoff and leachate seeps. This alternative is implementable; however, capital costs are high. Based on effectiveness and implementability, this alternative is retained.			

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Table 3-6
Screening of Alternatives - OU No. 3 Site 4
RSR Corporation Superfund Site

Page 2 of 2

Alternative	Effectiveness	Implementability	Cost (\$)	
Alternative No. 3 Protective Cap, Removal, and Monitoring	Advantages <ul style="list-style-type: none">Reduces potential for direct exposure to metals-contaminated soilsReduces infiltration into waste mass	Advantages <ul style="list-style-type: none">Equipment and materials commercially availableMethods proven full scale at hazardous waste sites	Capital:	\$3,528,600
	Disadvantages	Disadvantages	O&M:	\$3,970
	<ul style="list-style-type: none">No reduction in toxicity or volume of metals-contaminated soilsRestricts future land use	<ul style="list-style-type: none">Periodic long-term maintenance of protective soil cover requiredPotential mobilization of contaminants during regrading and application of protective soil coverMay be difficult to implement with current topography and bedrock conditionsLong-term monitoring required	Present Worth:	\$3,589,630
Conclusions - This alternative meets RAOs for soils and most of the RAOs for surface water/storm water runoff and leachate seeps. This alternative is implementable; however, long-term maintenance is required. Based on effectiveness and implementability, this alternative is retained.				
Alternative No. 4 Composite Cap, Removal, and Monitoring	Advantages <ul style="list-style-type: none">Provides maximum protection from exposure due to direct contactPrevents contact between surface waters and contaminants thus reducing mobility of contaminants	Advantages <ul style="list-style-type: none">Equipment and materials commercially availableMethods proven full scale at hazardous waste sites	Capital:	\$8,273,880
	Disadvantages	Disadvantages	O&M:	\$5,910
	<ul style="list-style-type: none">No reduction in toxicity or volume of metals-contaminated soilsDoes not address potential for landfill gas migrationRestricts future land usePotential migration of contaminants during excavation and regrading	<ul style="list-style-type: none">Long-term maintenance of composite cover requiredPotential mobilization of contaminants during regrading and application of composite coverMay be difficult to implement with current topography and bedrock conditionsRestricts future land useLong-term monitoring required	Present Worth:	\$8,364,730
Conclusions - This alternative meets RAOs for soils, surface water/stormwater runoff, sediment, and leachate seeps. This alternative provides more protection than Alternative No. 3 but at higher costs. This alternative is implementable; however, long-term maintenance is required. Based on effectiveness and implementability, this alternative is retained.				

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3.2.3.2.2 Monitoring. This portion of Alternative No. 1b includes a 5-year monitoring program for the groundwater and surface water in OU No. 3 Site 4. The groundwater will be monitored annually at three (3) existing wells used in the RI, including one (1) well upgradient and two (2) wells downgradient of the landfills. Surface water will be monitored annually at two (2) surface water locations along the Old Trinity River Channel. Included in this alternative is the cost associated with analyzing the groundwater and surface water samples for TAL metals. At the 5-year review, the monitoring program could be discontinued, reauthorized, or modified as appropriate. For costing purposes, only the 5-year monitoring program is included.

3.2.3.3 Site 4 Alternative No. 2: Removal and Monitoring

3.2.3.3.1 Removal. Under this alternative, 12 inches of surficial battery casing chips, slag, and related metals-contaminated soil will be excavated from the West Davis and Nomas Landfills and Jaycee Park where the RI delineates surficial smelter-related wastes and/or target cleanup goal exceedance (**Figure 3-6**). The underlying soil will be analyzed for levels of contamination present. If the remaining soil tests above the action levels for lead or arsenic, an additional 12 inches of soil would be removed.

Excavated soils would be temporarily stored onsite for analysis to determine if the soils display TCLP hazardous characteristics. For cost estimating purposes, it has been assumed that 100 samples will be collected and analyzed for TCLP and TAL metals. Soils determined to be noncharacteristic will be shipped to a nonhazardous disposal facility. For those soils determined to be hazardous, shipment will be to a RCRA Subtitle C landfill. Excavations will be backfilled, regraded, and compacted using conventional methods and clean soil. A maximum of 10 percent of the removed soil is assumed to meet the characteristics of hazardous waste. Based on site reconnaissance and sampling, it is assumed that 706,270 square feet of battery casing chips, slag, and related metals-contaminated wastes will be removed to an average depth of 12 inches. This calculates to approximately 26,160 cubic yards of excavated soil.

3.2.3.3.2 Monitoring. Same as Site 4 Alternative No. 1b.

3.2.3.4 Site 4 Alternative No. 3: Protective Cap, Removal, and Monitoring

3.2.3.4.1 Protective Cap and Removal. To limit direct human exposure to smelter-related contamination within Site 4, a protective soil cap will be placed over those areas within Nomas and West Dallas Landfills with exposed battery casing chips, slag, and related metals-contaminated soil (**Figure 3-7**). This alternative includes surficial excavation of isolated areas in Jaycee Park and Vilbig Landfill with target cleanup goal exceedances. Based on results in the RI (**EPA, 1995c**), it is assumed that 100 percent of the excavated soil will not test as TCLP hazardous and will be transported to the West Dallas Landfill to be spread and graded in locations where the protective cover will be placed (**Figure 3-7**). If excavated soil tests as TCLP hazardous, it will be transported to a RCRA Subtitle C landfill. For cost estimating purposes, it has been assumed that 2 samples will be collected and analyzed for TCLP and TAL metals.

A capping design plan will address surface preparation prior to the installation of the protective soil cap. It is assumed that 904,300 square feet of Nomas and West Dallas Landfills will be cleared of the current relatively sparse vegetation. The area to be capped is shown in **Figure 3-7** and comprises an area of 904,300 square feet. The protective cap will be graded for surface water to flow to the existing drainage channels and will consist of a coarse-base grade; a heavyweight, nonwoven geotextile; and a 24-inch protective/topsoil cover. The cap will be vegetated with appropriate native grasses and will be maintained for a period of 30 years.

This alternative assumes that surface preparation will be performed using conventional earthmoving equipment and methods. In addition, this alternative assumes the placement of the cap layers will be performed using conventional methods and that the appropriate soils will be locally obtained.

3.2.3.4.2 Monitoring. Same as Site 4 Alternative No. 1b. Annual inspection of cap is also included.

3.2.3.5 Site 4 Alternative No. 4: Composite Cap, Removal, and Monitoring

3.2.3.5.1 Composite Cap and Removal. Similar to Alternative 3 except that portions of West Dallas and Nomas Landfills will be covered with a composite barrier cap (Figure 3-7). Among capping options, a composite barrier cap provides maximum protection from exposure due to direct contact and is more effective for reducing infiltration into the landfill/soil mass. Components of the composite cover will include a gas-collection layer; a heavyweight, nonwoven geotextile; 24 inches of compacted clay; an FML; a drainage layer; a lightweight, nonwoven geotextile; and a 24-inch protective/topsoil cover. Because gas may build up below the barrier components, this alternative includes a nominal passive gas venting system. The cap will be vegetated with native grasses and will be maintained for a period of 30 years. This alternative assumes that surface preparation will be performed using conventional earthmoving equipment and methods. In addition, placement of the cap layers will be performed using conventional methods and the appropriate soils will be locally obtained. As in Alternative No. 3, the isolated excavated areas will be backfilled and regraded with clean soils.

3.2.3.5.2 Monitoring. Same as Site 4 Alternative No. 3.

3.3 Screening of Alternatives

Tables 3-4, 3-5, and 3-6 present the screening of Alternatives Nos. 1 through 4 for OU No. 3 Sites 1, 3, and 4. The alternatives were evaluated on the basis of effectiveness, implementability, and relative costs. The primary focus of the screening step was effectiveness, with less concern placed on implementability and relative costs. The objective of the screening stage is to further define the alternatives and eliminate those alternatives found to be ineffective, not implementable, and/or prohibitively costly.

Effectiveness pertains to:

- The degree of protection of human health, the environment, and workers during implementation
- The ability of the technology to comply with ARARs and to meet the RAOs

- The expected reliability and performance of the alternative with respect to site contaminants and conditions at the site

Evaluation of implementability addresses both the technical and administrative feasibility of implementing the technology. Implementability pertains to:

- The ability of necessary resources or supplies
- The availability to construct and operate a technology with demonstrated performance and useful life
- The availability and capacity of offsite treatment and disposal facilities

Relative costs will be used to screen out alternatives only if the cost is believed to be significantly higher while effectiveness or implementability are not significantly different. The cost estimates include general capital and operation and maintenance (O&M) costs.

Based on this evaluation, all alternatives were retained for detailed analysis except Alternative No. 4 for Site 3. This alternative was eliminated because of high costs and relatively minor difference in effectiveness and implementability.

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Table 3-4
Screening of Alternatives - OU No. 3 Site 1
RSR Corporation Superfund Site

Page 1 of 2

Alternative	Effectiveness	Implementability	Cost (\$)
Alternative No. 1a	Advantages	Advantages	Capital: \$0
No Action	• Not Applicable	• Implementable	O&M: \$0
	Disadvantages	Disadvantages	Present Worth: \$0
	• No reduction in toxicity, mobility, or volume of contaminants • No reduction in human exposure to contaminants	• Not Applicable	
Conclusions - This alternative does not meet RAOs for soils, surface water/storm water runoff, sediment, or leachate seeps. This alternative is implementable and incurs no cost. Based on the NCP, this alternative is retained			
Alternative No. 1b	Advantages	Advantages	Capital: \$99,040
Institutional Controls and Monitoring	• Limits site access and community exposure	• Implementable	O&M: \$2,580
	Disadvantages	Disadvantages	Present Worth: \$110,210
	• Restricts future land use • No reduction in toxicity, mobility, or volume of contaminants	• May be difficult to implement and enforce	
Conclusions - This alternative does not meet most RAOs. However, to preserve a range of alternatives, this alternative is retained.			
Alternative No. 2	Advantages	Advantages	Capital: \$1,503,490
Removal and Monitoring	• Eliminates human exposure to metals-contaminated soils • Reduces mobility of residual contamination • Contamination source for stormwater and surface water removed	• Implementable • Equipment and materials commercially available • Methods proven full scale at hazardous waste sites • No long-term maintenance	Annual O&M: \$2,580
	Disadvantages	Disadvantages	Present Worth: \$1,514,660
	• Increase in volume of contaminants due to soil bulking effects	• May mobilize contaminants during excavation of soils	
Conclusions - This alternative meets RAOs for soils and sediments and most of the RAOs for surface water/storm water runoff and leachate seeps. This alternative is implementable; however, capital costs are high. Based on effectiveness and implementability, this alternative is retained.			

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Table 3-4
Screening of Alternatives - OU No. 3 Site 1
RSR Corporation Superfund Site

Page 2 of 2

Alternative	Effectiveness	Implementability	Cost (\$)	
Alternative No. 3 Protective Cap, Removal, and Monitoring	Advantages	Advantages	Capital:	\$671,880
	<ul style="list-style-type: none">• Reduces potential for direct exposure to metals-contaminated soils• Reduces infiltration into waste mass	<ul style="list-style-type: none">• Equipment and materials commercially available• Methods proven full scale at hazardous waste sites	O&M:	\$3,530
	Disadvantages	Disadvantages	Present Worth:	\$726,140
	<ul style="list-style-type: none">• No reduction in toxicity or volume of metals-contaminated soils• Restricts future land use	<ul style="list-style-type: none">• Periodic long-term maintenance of protective soil cover required• Potential mobilization of contaminants during regrading and application of protective soil cover• May be difficult to implement with current topography and bedrock conditions		
Conclusions - This alternative meets RAOs for soils and sediments and some of the RAOs for surface water/storm water runoff and leachate seeps.				
Alternative No. 4	Advantages	Advantages	Capital:	\$1,161,670
Composite Cap, Removal, and Monitoring	<ul style="list-style-type: none">• Provides maximum protection from exposure due to direct contact• Most effective capping option for reducing infiltration in compliance with RCRA guidance• Moderately effective in locations where sediments are a medium of concern• Prevents contact between surface waters and contaminants thus reducing mobility of contaminants	<ul style="list-style-type: none">• Equipment and materials commercially available• Methods proven full scale at hazardous waste sites	O&M:	\$3,530
	Disadvantages	Disadvantages	Present Worth:	\$1,215,930
	<ul style="list-style-type: none">• No reduction in toxicity or volume of metals-contaminated soils• Restricts future land use• Potential migration of contaminants during excavation and construction via surface water	<ul style="list-style-type: none">• Long-term maintenance of composite cover required• Potential mobilization of contaminants during regrading and application of composite cover• May be difficult to implement with current topography and bedrock conditions• Restricts future land use		
Conclusions - This alternative meets RAOs for soils, surface water/stormwater runoff, sediment, and leachate seeps. This alternative provides more protection than Alternative No. 3 but at higher costs. This alternative is implementable; however, long-term maintenance is required. Based on effectiveness and implementability, this alternative is retained.				

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Table 3-5
Screening of Alternatives - OU No. 3 Site 3
RSR Corporation Superfund Site

Page 1 of 3

Alternative	Effectiveness	Implementability	Cost (\$)
Alternative No. 1a	Advantages	Advantages	Capital: \$0
No Action	• Not Applicable	• Implementable	O&M: \$0
	Disadvantages	Disadvantages	Present Worth: \$0
	• No reduction in toxicity, mobility, or volume of contaminants • No reduction in human exposure to contaminants	• Not Applicable	
Conclusions - This alternative does not meet RAOs for soils, surface water/storm water runoff, sediment, or leachate seeps. This alternative is implementable and incurs no cost. Based on the NCP, this alternative is retained.			
Alternative No. 1b	Advantages	Advantages	Capital: \$344,350
Institutional Controls and Monitoring	• Limits site access and community exposure	• Implementable	O&M: \$6,530
	Disadvantages	Disadvantages	Present Worth: \$372,620
	• Restricts future land use • No reduction in toxicity, mobility, or volume of contaminants	• May be difficult to implement and enforce	
Conclusions - This alternative does not meet most RAOs. However, to preserve a range of alternatives, this alternative is retained.			
Alternative No. 2	Advantages	Advantages	Capital: \$1,620,810
Removal and Monitoring	• Eliminates exposure to metals-contaminated soils • Reduces mobility of residual contamination • Smelter-related contamination source for stormwater and surface water removed	• Equipment and materials commercially available • Methods proven full scale at hazardous waste sites • No long-term maintenance	Annual O&M: \$6,540
	Disadvantages	Disadvantages	Present Worth: \$1,649,120
	• Increase in volume of contaminants due to soil bulking effects	• May mobilize contaminants during excavation of soils	
Conclusions - This alternative meets RAOs for soils and some of the RAOs for surface water/storm water runoff and leachate seeps. This alternative is implementable; however, capital costs are high. Based on effectiveness and implementability, this alternative is retained.			

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Table 3-5
Screening of Alternatives - OU No. 3 Site 3
RSR Corporation Superfund Site

Page 2 of 3

Alternative	Effectiveness	Implementability	Cost (\$)
Alternative No. 3	Advantages	Advantages	Capital: \$1,175,610
Excavation, Containment, and Monitoring	<ul style="list-style-type: none"> Reduces potential for direct exposure to metals-contaminated soils Reduces infiltration into areas exposed to smelter-related contamination 	<ul style="list-style-type: none"> Equipment and materials commercially available Methods proven full scale at hazardous waste sites 	O&M: \$4,490
	Disadvantages	Disadvantages	Present Worth: \$1,244,630
	<ul style="list-style-type: none"> No reduction in toxicity or volume of metals-contaminated soils and landfill contents Does not address leachate seeps and gas migration issues outside of areas of smelter-related contamination 	<ul style="list-style-type: none"> Periodic long-term maintenance of protective soil cover required Potential mobilization of contaminants during excavating, regrading and application of soil covers Long-term monitoring required 	
Conclusions - This alternative meets RAOs for soils and some of the RAOs for surface water/storm water runoff and leachate seeps. This alternative is implementable; however, long-term maintenance is required. Based on effectiveness and implementability, this alternative is retained.			
Alternative No. 4	Advantages	Advantages	Capital: \$24,062,910
Ditch/Channel Protection, Containment, Excavation, Surface Controls, and Monitoring	<ul style="list-style-type: none"> Provides maximum protection from exposure due to direct contact Most effective capping option for reducing infiltration in compliance with RCRA guidance Moderately effective in locations where sediments are a medium of concern Addresses leachate seeps and gas migration issues outside of areas of smelter-related contamination Prevents contact between surface waters and contaminants thus reducing mobility of contaminants 	<ul style="list-style-type: none"> Equipment and materials commercially available Methods proven full scale at hazardous waste sites 	O&M: \$7,520
			Present Worth: \$24,178,500

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Table 3-5
Screening of Alternatives - OU No. 3 Site 3
RSR Corporation Superfund Site

Page 3 of 3

Alternative	Effectiveness	Implementability	Cost (\$)
	Disadvantages <ul style="list-style-type: none"> • No reduction in toxicity or volume of metals-contaminated soils • Restricts future land use • Potential migration of contaminants during excavation and construction via surface water 	Disadvantages <ul style="list-style-type: none"> • Long-term maintenance of composite cover required • Potential mobilization of contaminants during regrading and application of composite cover • May be difficult to implement with current topography and bedrock conditions • Restricts future land use • Long-term monitoring required 	

Conclusions: This alternative meets RAOs; however, due to high cost and little difference in effectiveness and implementability, this alternative is not retained.

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Table 3-6
Screening of Alternatives - OU No. 3 Site 4
RSR Corporation Superfund Site

Page 1 of 2

Alternative	Effectiveness	Implementability	Cost (\$)
Alternative No. 1a	Advantages	Advantages	Capital: \$0
No Action	<ul style="list-style-type: none"> • Not Applicable 	<ul style="list-style-type: none"> • Implementable 	O&M: \$0
	Disadvantages	Disadvantages	Present Worth: \$0
	<ul style="list-style-type: none"> • No reduction in toxicity, mobility, or volume of contaminants • No reduction in human exposure to contaminants 	<ul style="list-style-type: none"> • Not Applicable 	
Conclusions - This alternative does not meet RAOs for soils, surface water/storm water runoff, or leachate seeps. This alternative is implementable and incurs no cost. Based on the NCP, this alternative is retained			
Alternative No. 1b	Advantages	Advantages	Capital: \$311,260
Institutional Controls and Monitoring	<ul style="list-style-type: none"> • Limits site access and community exposure 	<ul style="list-style-type: none"> • Implementable 	O&M: \$4,230
	Disadvantages	Disadvantages	Present Worth: \$329,570
	<ul style="list-style-type: none"> • Restricts future land use • No reduction in toxicity, mobility, or volume of contaminants 	<ul style="list-style-type: none"> • May be difficult to implement and enforce 	
Conclusions - This alternative does not meet most RAOs. However, to preserve a range of alternatives, this alternative is retained.			
Alternative No. 2	Advantages	Advantages	Capital: \$5,958,810
Removal and Monitoring	<ul style="list-style-type: none"> • Eliminates exposure to metals-contaminated soils • Reduces mobility of residual contamination 	<ul style="list-style-type: none"> • Equipment and materials commercially available • Methods proven full scale at hazardous waste sites • No long-term maintenance 	Annual O&M: \$4,230
	Disadvantages	Disadvantages	Present Worth: \$5,977,120
	<ul style="list-style-type: none"> • Increase in volume of contaminants due to soil bulking effects 	<ul style="list-style-type: none"> • May mobilize contaminants during excavation of soils 	
Conclusions - This alternative meets RAOs for soils and some of the RAOs for surface water/storm water runoff and leachate seeps. This alternative is implementable; however, capital costs are high. Based on effectiveness and implementability, this alternative is retained.			

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Table 3-6
Screening of Alternatives - OU No. 3 Site 4
RSR Corporation Superfund Site

Page 2 of 2

Alternative	Effectiveness	Implementability	Cost (\$)	
Alternative No. 3 Protective Cap, Removal, and Monitoring	Advantages <ul style="list-style-type: none">• Reduces potential for direct exposure to metals-contaminated soils• Reduces infiltration into waste mass	Advantages <ul style="list-style-type: none">• Equipment and materials commercially available• Methods proven full scale at hazardous waste sites	Capital:	\$3,528,600
	Disadvantages	Disadvantages	O&M:	\$3,970
	<ul style="list-style-type: none">• No reduction in toxicity or volume of metals-contaminated soils• Restricts future land use	<ul style="list-style-type: none">• Periodic long-term maintenance of protective soil cover required• Potential mobilization of contaminants during regrading and application of protective soil cover• May be difficult to implement with current topography and bedrock conditions• Long-term monitoring required	Present Worth:	\$3,589,630
Conclusions - This alternative meets RAOs for soils and most of the RAOs for surface water/storm water runoff and leachate seeps. This alternative is implementable; however, long-term maintenance is required. Based on effectiveness and implementability, this alternative is retained.				
Alternative No. 4 Composite Cap, Removal, and Monitoring	Advantages <ul style="list-style-type: none">• Provides maximum protection from exposure due to direct contact• Prevents contact between surface waters and contaminants thus reducing mobility of contaminants	Advantages <ul style="list-style-type: none">• Equipment and materials commercially available• Methods proven full scale at hazardous waste sites	Capital:	\$8,273,880
	Disadvantages	Disadvantages	O&M:	\$5,910
	<ul style="list-style-type: none">• No reduction in toxicity or volume of metals-contaminated soils• Does not address potential for landfill gas migration• Restricts future land use• Potential migration of contaminants during excavation and regrading	<ul style="list-style-type: none">• Long-term maintenance of composite cover required• Potential mobilization of contaminants during regrading and application of composite cover• May be difficult to implement with current topography and bedrock conditions• Restricts future land use• Long-term monitoring required	Present Worth:	\$8,364,730
Conclusions - This alternative meets RAOs for soils, surface water/stormwater runoff, sediment, and leachate seeps. This alternative provides more protection than Alternative No. 3 but at higher costs. This alternative is implementable; however, long-term maintenance is required. Based on effectiveness and implementability, this alternative is retained.				

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Section 4
Detailed Analysis of Alternatives

Section 4
Detailed Analysis of Alternatives

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4.1 Introduction

Section 4 presents the final step of the multistep evaluation process, a detailed analysis on a limited number of alternatives that represent viable approaches to remedial action. The alternatives presented in **Section 3** that were retained after the screening evaluation are further described in this section. Each alternative is assessed against the nine (9) evaluation criteria required and defined by the NCP. The results of this assessment are compared among the various alternatives to determine the best remedial action for OU No. 3. This approach is designed to provide sufficient information to adequately compare the alternatives and provide the basis for selecting an appropriate remedy for OU No. 3 pursuant to CERCLA remedy selection requirements. The selected remedial action will be documented in the ROD.

In accordance with the NCP, the nine (9) evaluation criteria were used to evaluate technical and policy considerations that are important for selecting a remedial alternative (40 C.F.R. §300, 400(e)(9)(iii)). These evaluation criteria serve as the basis for conducting the detailed analyses and selecting an appropriate remedial action.

The first two (2) of the nine (9) criteria are minimum, or "threshold," criteria that must be met by all alternatives. The next five (5) criteria are considered "balancing" criteria and are the primary criteria upon which the following analysis is based. The last two (2), considered to be "modifying" criteria, will not be discussed in this FS but will be deferred until the public comment process. The nine (9) evaluation criteria, which are defined in the NCP, are as follows:

1. **Overall protection of human health and the environment.**
Alternatives shall be assessed to determine whether they can adequately protect human health and the environment, in both the short and long term, from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the RSR Site by eliminating, reducing, or

controlling exposures to levels established during development of remediation goals consistent with §300.430(e)(2)(i). Overall protection of human health and the environment draws on the assessments of other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs.

2. **Compliance with ARARs.** The alternatives shall be assessed to determine whether they attain ARARs under federal environmental laws and state environmental or facility siting laws or provide grounds for invoking one of the waivers.
3. **Long-term effectiveness and permanence.** Alternatives shall be assessed for the long-term effectiveness and permanence they afford, along with the degree of certainty that the alternative will prove successful. Factors that shall be considered, as appropriate, include the following:
 - (a) Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities. The characteristics of the residuals should be considered to the degree that they remain hazardous, taking into account their TMV and propensity to bioaccumulate.
 - (b) Adequacy and reliability of controls, such as containment systems and institutional controls, that are necessary to manage treatment residuals and untreated waste. This factor addresses in particular the uncertainties associated with land disposal for providing long-term protection from residuals; the assessment of the potential need to replace technical components of the alternative; and the potential exposure pathways and risks posed should the remedial action need replacement.
3. **Reduction of TMV through treatment.** The degree to which alternatives employ recycling or treatment that reduces TMV shall be assessed, including how treatment is used to address the principal threats posed by the RSR Site. Factors that shall be considered as appropriate include the following:

- (a) The treatment or recycling processes the alternatives employ and materials they will treat
- (b) The amount of hazardous substances, pollutants, or contaminants that will be destroyed, treated, or recycled
- (c) The degree of expected reduction in TMV of the waste due to treatment or recycling and the specification of which reduction(s) are occurring
- (d) The degree to which the treatment is irreversible
- (e) The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate hazardous substances and their constituents
- (f) The degree to which treatment reduces the inherent hazards posed by principal threats at the site

5. **Short-term effectiveness.** The short-term effects of alternatives shall be assessed considering the following:

- (a) Short-term risks that might be posed to the community during implementation of an alternative
- (b) Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures
- (c) Potential environmental effects of the remedial action and the effectiveness and reliability of mitigative measures during implementation
- (d) Time until protection is achieved

6. **Implementability.** The ease or difficulty of implementing the alternatives shall be assessed by considering the following types of factors as appropriate:
- (a) Technical feasibility, including the technical difficulties and the unknowns associated with the construction and operation of a technology, the reliability of the technology, ease of undertaking additional remedial actions, and the ability to monitor the effectiveness of the remedy
 - (b) Administrative feasibility, including activities needed to coordinate with other offices and agencies and the ability and time required to obtain any necessary approvals and permits from other agencies (for offsite action)
 - (c) Availability of services and materials, including the availability of adequate offsite treatment, storage capacity, and disposal capacity and services; the availability of necessary equipment, specialists, and provisions to ensure any necessary additional resources; the availability of services and materials; and the availability of prospective technologies.
7. **Cost.** The types of costs that shall be assessed include the following:
- (a) Capital costs, including both direct and indirect costs
 - (b) Annual O&M costs
 - (c) Net present value of capital and O&M costs
8. **State acceptance.** Assessment of state concerns may not be completed until comments on the RI/FS are received but may be discussed, to the extent possible, in the proposed plan issued for public comment. The state concerns that shall be assessed include the following:
- (a) The state's position and key concerns related to the preferred alternative and other alternatives

(b) The state's comments on ARARs or the proposed use of waivers.

9. **Community acceptance.** This assessment includes determining which components of the alternatives that interested persons in the community support, have reservations about, or oppose. This assessment may not be completed until comments on the proposed plan are received.

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Tables 4-1, 4-2, and 4-3 present detailed analysis of each individual alternative with respect to the first seven (7) evaluation criteria (threshold and balancing criteria) for Sites 1, 3, and 4, respectively.

4.2 Comparative Analysis

A comparative analysis of alternatives, using each of the first seven (7) evaluation criteria, is presented in this section to identify the advantages and disadvantages of each alternative relative to the other alternatives. This comparative analysis is designed to aid decision makers in the selection of the best alternative for this particular remedial action. A summary of the comparative analysis is presented in Tables 4-4, 4-5, and 4-6.

4.2.1 Site 1

4.2.1.1 Site 1 Alternative No. 1a: No Action

Alternative No. 1a does not meet the threshold balancing criteria. It is not protective of human health and the environment since community and environmental exposure is not reduced. RAOs are not met for any of the media. Compliance with ARARs, including RCRA and stormwater requirements, will not be achieved.

Since the contamination is left in an uncontrolled state, this alternative does not provide long-term effectiveness or permanence, reduction of TMV through treatment, or short-term effectiveness. This alternative is implementable and has the lowest cost.

Table 4-1
Detailed Analysis of Alternatives - Site 1, OU No. 3
RSR Corporation Superfund Site

Page 1 of 2

Evaluation Criteria	Alternative 1a: No Action	Alternative 1b: Institutional Controls and Monitoring	Alternative 2: Removal and Monitoring	Alternative 3: Protective Cap, Removal, and Monitoring	Alternative 4: Composite Cap, Removal, and Monitoring
Overall Protection of Human Health and the Environment	Not protective of human health and the environment. This alternative will not reduce the community and environmental exposure to contaminated materials. Does not achieve RAOs for soils, sediments, or surface water.	Not protective of human health and the environment. This alternative will not reduce environmental exposure to contaminated materials and only marginally reduces the community exposure. The trespasser exposure is not reduced. Does not achieve RAOs for soils, sediments, or surface water.	This alternative is protective of human health and the environment. RAOs are met for soils, sediments, and surface water.	This alternative is protective of human health and the environment. RAOs are met for soils, sediments, and surface water.	This alternative is protective of human health and the environment. RAOs are met for soils, sediments, and surface water.
Compliance with ARARs	This alternative does not comply with ARARs identified for OU No. 3. Specifically, RCRA characteristic wastes will remain in an uncontrolled state and RCRA requirements (30 T.A.C. § 335.8) for closure and remediation will not be met.	This alternative does not comply with ARARs identified for OU No. 3. Specifically, RCRA characteristic wastes will remain in an uncontrolled state and RCRA requirements (30 T.A.C. § 335.8) for closure and remediation will not be met.	<p>This alternative complies with ARARs. Specifically, RCRA closure and remediation requirements (30 T.A.C. § 335.8).</p> <p>RCRA handling, transportation, treatment, and disposal requirements (30 T.A.C. § 335.11, § 335.91, § 335.111 and § 335.112) will be met.</p> <p>By managing soils, battery chips, and slag, storm runoff and surface water quality will improve to help meet the intent of 40 CFR Parts 120 and 125.</p>	<p>This alternative complies with ARARs. Specifically, RCRA closure and remediation requirements (30 T.A.C. § 335.8).</p> <p>RCRA handling, transportation, treatment, and disposal requirements (30 T.A.C. § 335.11, § 335.91, § 335.111 and § 335.112) will be met.</p> <p>By managing soils, battery chips, and slag, storm runoff and surface water quality will improve to help meet the intent of 40 CFR Parts 120 and 125.</p>	<p>This alternative complies with ARARs. Specifically, RCRA closure and remediation requirements (30 T.A.C. § 335.8).</p> <p>RCRA handling, transportation, treatment, and disposal requirements (30 T.A.C. § 335.11, § 335.91, § 335.111 and § 335.112) will be met.</p> <p>By managing soils, battery chips, and slag, and sediments, storm runoff and surface water quality will improve to help meet the intent of 40 CFR Parts 120 and 125.</p>
Long-Term Effectiveness and Permanence	Long-term effectiveness and permanence is not achieved. No removal of contaminated media from the Site.	Long-term effectiveness and permanence is not achieved. No removal of contaminated media from the Site.	Long-term effectiveness and permanence achieved by this alternative by removing soils, battery chips, and slag exceeding target cleanup levels.	Moderate long-term effectiveness and permanence achieved by this alternative by capping soil, battery chip, and slag. The cap is not permanent and requires long-term monitoring and maintenance.	Moderate long-term effectiveness and permanence achieved by this alternative by removing sediments and capping soil, battery chip, and slag. The cap is not permanent and requires long-term monitoring and maintenance.
Reduction of Toxicity, Mobility, or Volume through Treatment	No reduction in toxicity, mobility, or volume of contaminated media.	No reduction in toxicity, mobility, or volume of contaminated media.	Reduction in mobility for wastes stabilized in RCRA Subtitle C landfill. No reduction of toxicity or volume.	Reduction of mobility of metals-contaminated soils, battery chips, and slag through containment; however, no reduction in toxicity or volume.	Reduction of mobility of metals-contaminated soils, battery chips, slag, and sediments through containment; however, no reduction in toxicity or volume.

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Table 4-1
Detailed Analysis of Alternatives - Site 1, OU No. 3
RSR Corporation Superfund Site

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Evaluation Criteria	Alternative 1a: No Action	Alternative 1b: Institutional Controls and Monitoring	Alternative 2: Removal and Monitoring	Alternative 3: Protective Cap, Removal, and Monitoring	Alternative 4: Composite Cap, Removal, and Monitoring
Short-Term Effectiveness	Short-term effectiveness not achieved. No removal of contaminated media from the Site.	Short-term effectiveness not achieved. No removal of contaminated media from the Site.	Short-term risk to the community may increase during implementation. Dust control measures will be implemented during excavation. Heavy vehicular traffic may cause some nuisance to the community. There is potential for worker exposure during excavation. All appropriate regulations and safety measures will be instituted and strictly enforced.	Short-term risk is minimal in this alternative. Heavy vehicular traffic may cause some nuisance to the community during cap construction.	Short-term risk is minimal in this alternative. Heavy vehicular traffic may cause some nuisance to the community during cap construction and sediment removal.
Implementability	Implementable.	Monitoring is implementable. The deed notices and land use restrictions may be difficult to obtain and enforce.	Personnel, equipment, and facilities for implementation of technologies associated with this alternative are readily available.	Personnel, equipment, and facilities for implementation of technologies associated with this alternative are readily available.	Personnel, equipment, and facilities for implementation of technologies associated with this alternative are readily available.
Cost (\$)					
Capital Cost	\$0	\$99,040	\$1,503,490	\$671,880	\$1,161,670
Annual O&M	\$0	\$2,580	\$2,580	\$3,530	\$3,530
Present Worth	\$0	\$110,210	\$1,514,660	\$726,140	\$1,215,930

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Table 4-2
Detailed Analysis of Alternatives - Site 3, OU No. 3
RSR Cooperation Superfund Site

Page 1 of 2

Evaluation Criteria	Alternative 1a: No Action	Alternative 1b: Institutional Controls and Monitoring	Alternative 2: Removal and Monitoring	Alternative 3: Excavation, Surface Controls, Containment, and Monitoring
Overall Protection of Human Health and the Environment	Not protective of human health and the environment. This alternative will not reduce the community and environmental exposure to contaminated materials. Does not achieve RAOs for soils, sediments, or surface water.	Not protective of human health and the environment. This alternative will not reduce environmental exposure to contaminated materials and only marginally reduces the community exposure. The trespasser exposure is not reduced. Does not achieve RAOs for soils, sediments, or surface water.	This alternative is protective of human health and the environment. RAOs are met for soils, sediments, and surface water.	This alternative is protective of human health and the environment. RAOs are met for soils, sediments, and surface water.
Compliance with ARARs	This alternative does not comply with ARARs identified for OU No. 3. Specifically, RCRA characteristic wastes will remain in an uncontrolled state and RCRA requirements (30 T.A.C. § 335.8) for closure and remediation will not be met.	This alternative does not comply with ARARs identified for OU No. 3. Specifically, RCRA characteristic wastes will remain in an uncontrolled state and RCRA requirements (30 T.A.C. § 335.8) for closure and remediation will not be met.	This alternative complies with ARARs. Specifically, RCRA closure and remediation requirements (30 T.A.C. § 335.8). RCRA handling, transportation, treatment, and disposal requirements (30 T.A.C. § 335.11, § 335.91, § 335.111 and § 335.112) will be met. By managing soils, battery chips, and slag, storm runoff and surface water quality will improve to help meet the intent of 40 CFR Parts 120 and 125.	This alternative complies with ARARs. Specifically, RCRA closure and remediation requirements (30 T.A.C. § 335.8). Closure requirements (30 T.A.C. § 330.251) for municipal solid waste landfills will be met. RCRA handling, transportation, treatment, and disposal requirements (30 T.A.C. § 335.11, § 35.91, § 335.111 and § 335.112) will be met. By managing soils, battery chips, and slag, storm runoff and surface water quality will improve to help meet the intent of 40 CFR Parts 120 and 125.
Long-Term Effectiveness and Permanence	Long-term effectiveness and permanence is not achieved. No removal of contaminated media from the Site.	Long-term effectiveness and permanence is not achieved. No removal of contaminated media from the Site.	Long-term effectiveness and permanence achieved by this alternative by removing soils, battery chips, and slag exceeding target cleanup levels.	Moderate long-term effectiveness and permanence achieved by this alternative by capping soil, battery chip, and slag. The cap is not permanent and requires long-term monitoring and maintenance.
Reduction of Toxicity, Mobility, or Volume through Treatment	No reduction in toxicity, mobility, or volume of contaminated media.	No reduction in toxicity, mobility, or volume of contaminated media.	Reduction in mobility for wastes stabilized in RCRA Subtitle C landfill. No reduction of mobility or volume.	Reduction of mobility of metals-contaminated soils, battery chips, and slag through containment; however, no reduction in toxicity or volume.
Short-Term Effectiveness	Short-term effectiveness not achieved. No removal of contaminated media from the Site.	Short-term effectiveness not achieved. No removal of contaminated media from the Site.	Short-term risk to the community may increase during implementation. Dust control measures will be implemented during excavation. Heavy vehicular traffic may cause some nuisance to the community. There is potential for worker exposure during excavation. All appropriate regulations and safety measures will be instituted and strictly enforced.	Short-term risk is minimal in this alternative. Heavy vehicular traffic may cause some nuisance to the community during cap construction.

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Table 4-2
Detailed Analysis of Alternatives - Site 3, OU No. 3
RSR Cooperation Superfund Site

Page 2 of 2

Evaluation Criteria	Alternative 1a: No Action	Alternative 1b: Institutional Controls and Monitoring	Alternative 2: Removal and Monitoring	Alternative 3: Excavation, Surface Controls, Containment, and Monitoring
Implementability	Implementable.	Monitoring is Implementable. The deed notices and land use restrictions may be difficult to obtain and enforce.	Personnel, equipment, and facilities for implementation of technologies associated with this alternative are readily available	Personnel, equipment, and facilities for implementation of technologies associated with this alternative are readily available
Cost (\$)				
Capital Cost	\$0	\$344,350	\$1,620,810	\$1,175,610
Annual O&M	\$0	\$6,530	\$6,540	\$4,490
Present Worth	\$0	\$372,620	\$1,649,120	\$1,244,630

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Table 4-3
Detailed Analysis of Alternatives - Site 4, OU No. 3
RSR Corporation Superfund Site

Page 1 of 2

Evaluation Criteria	Alternative 1a: No Action	Alternative 1b: Institutional Controls and Monitoring	Alternative 2: Removal and Monitoring	Alternative 3: Protective Cap, Removal, and Monitoring	Alternative 4: Composite Cap, Removal, and Monitoring
Overall Protection of Human Health and the Environment	Not protective of human health and the environment. This alternative will not reduce the community and environmental exposure to contaminated materials. Does not achieve RAOs for soils, sediments, or surface water.	Not protective of human health and the environment. This alternative will not reduce environmental exposure to contaminated materials and only marginally reduces the community exposure. The trespasser exposure is not reduced. Does not achieve RAOs for soils, sediments, or surface water.	This alternative is protective of human health and the environment. RAOs are met for soils, sediments, and surface water.	This alternative is protective of human health and the environment. RAOs are met for soils, sediments, and surface water.	This alternative is protective of human health and the environment. RAOs are met for soils, sediments, and surface water.
Compliance with ARARs	This alternative does not comply with ARARs identified for OU No. 3. Specifically, RCRA characteristic wastes will remain in an uncontrolled state and RCRA requirements (30 T.A.C. § 335.8) for closure and remediation will not be met.	This alternative does not comply with ARARs identified for OU No. 3. Specifically, RCRA characteristic wastes will remain in an uncontrolled state and RCRA requirements (30 T.A.C. § 335.8) for closure and remediation will not be met.	This alternative complies with ARARs. Specifically, RCRA closure and remediation requirements (30 T.A.C. § 335.8) will be met. RCRA handling, transportation, treatment, and disposal requirements (30 T.A.C. § 335.11, § 335.91, § 335.111 and § 335.112) will be met. By managing soils, battery chips, and slag, storm runoff and surface water quality will improve to help meet the intent of 40 CFR Parts 120 and 125.	This alternative complies with ARARs. Specifically, RCRA closure and remediation requirements (30 T.A.C. § 335.8) will be met. Closure requirements (30 T.A.C. § 330.251) for municipal solid waste landfills will be met. RCRA handling, transportation, treatment, and disposal requirements (30 T.A.C. § 335.11, § 335.91, § 335.111 and § 335.112) will be met. By managing soils, battery chips, and slag, storm runoff and surface water quality will improve to help meet the intent of 40 CFR Parts 120 and 125.	This alternative complies with ARARs. Specifically, RCRA closure and remediation requirements (30 T.A.C. § 335.8) will be met. Closure requirements (30 T.A.C. § 330.251) for municipal solid waste landfills will be met. RCRA handling, transportation, treatment, and disposal requirements (30 T.A.C. § 335.11, § 335.91, § 335.111 and § 335.112) will be met. By managing soils, battery chips, and slag, storm runoff and surface water quality will improve to help meet the intent of 40 CFR Parts 120 and 125.
Long-Term Effectiveness and Permanence	Long-term effectiveness and permanence is not achieved. No removal of contaminated media from the Site.	Long-term effectiveness and permanence is not achieved. No removal of contaminated media from the Site.	Long-term effectiveness and permanence is not achieved. No removal of contaminated media from the Site.	Moderate long-term effectiveness and permanence achieved by this alternative by capping soil, battery chip, and slag. The cap is not permanent and requires long-term monitoring and maintenance. Long-term effectiveness and permanence achieved for the excavated soils at the Jaycee Park.	Moderate long-term effectiveness and permanence achieved by this alternative by removing sediments and capping soil, battery chip, and slag. The cap is not permanent and requires long-term monitoring and maintenance. Long-term effectiveness and permanence achieved for the excavated soils at the Jaycee Park.

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Table 4-3
Detailed Analysis of Alternatives - Site 4, OU No. 3
RSR Corporation Superfund Site

Page 2 of 2

Evaluation Criteria	Alternative 1a: No Action	Alternative 1b: Institutional Controls and Monitoring	Alternative 2: Removal and Monitoring	Alternative 3: Protective Cap, Removal, and Monitoring	Alternative 4: Composite Cap, Removal, and Monitoring
Reduction of Toxicity, Mobility, or Volume through Treatment	No reduction in toxicity, mobility, or volume of contaminated media.	No reduction in toxicity, mobility, or volume of contaminated media.	Reduction in mobility for wastes stabilized in RCRA Subtitle C landfill. No reduction of toxicity or volume.	Reduction of mobility of metals-contaminated soils, battery chips, and slag through containment; however, no reduction in toxicity or volume.	Reduction of mobility of metals-contaminated soils, battery chips, and slag through containment; however, no reduction in toxicity or volume.
Short-Term Effectiveness	Short-term effectiveness not achieved. No removal of contaminated media from the Site.	Short-term effectiveness not achieved. No removal of contaminated media from the Site.	Short-term risk to the community may increase during implementation. Dust control measures will be implemented during excavation. Heavy vehicular traffic may cause some nuisance to the community. There is potential for worker exposure during excavation. All appropriate regulations and safety measures will be instituted and strictly enforced.	Short-term risk is minimal in this alternative. Heavy vehicular traffic may cause some nuisance to the community during cap construction.	Short-term risk is minimal in this alternative. Heavy vehicular traffic may cause some nuisance to the community during cap construction and sediment removal.
Implementability	Implementable.	Monitoring is implementable. The deed notices and land use restrictions may be difficult to obtain and enforce.	Personnel, equipment, and facilities for implementation of technologies associated with this alternative are readily available.	Personnel, equipment, and facilities for implementation of technologies associated with this alternative are readily available.	Personnel, equipment, and facilities for implementation of technologies associated with this alternative are readily available.
Cost (\$)					
Capital Cost	\$0	\$311,260	\$5,958,810	\$3,528,600	\$8,273,880
Annual O&M	\$0	\$4,230	\$4,230	\$3,970	\$5,910
Present Worth	\$0	\$329,570	\$5,977,120	\$3,589,630	\$8,364,730

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<p align="center">Table 4-4 Summary of Detailed Analysis of Alternatives - Site 1, OU No. 3 RSR Corporation Superfund Site</p>					
Evaluation Criteria	Alternative No. 1a: No Action	Alternative No. 1b: Institutional Controls and Monitoring	Alternative No. 2: Removal and Monitoring	Alternative No. 3: Protective Cap, Removal, and Monitoring	Alternative No. 4: Composite Cap, Removal, and Monitoring
Overall Protection of Human Health and the Environment	-	0	++	++	++
Compliance with ARARs	-	-	++	++	++
Long-Term Effectiveness and Permanence	-	0	++	√+	++
Reduction of Toxicity, Mobility, or Volume through Treatment	-	-	++	√+	++
Short-Term Effectiveness	-	0	√+	++	++
Implementability	++	0	++	++	++
Cost (\$)					
Capital	\$0	\$99,040	\$1,503,490	\$671,880	\$1,161,670
O&M	\$0	\$2,580	\$2,580	\$3,530	\$3,530
Present Worth	\$0	\$110,210	\$1,514,660	\$726,140	\$1,215,930
<p>Legend=</p> <p>- = Unacceptable</p> <p>o = Marginally Acceptable</p> <p>√+ = Acceptable</p> <p>++ = Acceptable/Best Fit</p>					

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<p align="center">Table 4-5 Summary of Detailed Analysis of Alternatives - Site 3, OU No. 3 RSR Corporation Superfund Site</p>				
Evaluation Criteria	Alternative No. 1a: No Action	Alternative No. 1b: Institutional Controls and Monitoring	Alternative No. 2: Removal and Monitoring	Alternative No. 3: Excavation, Surface Controls, Containment, and Monitoring
Overall Protection of Human Health and the Environment	-	0	++	++
Compliance with ARARs	-	-	++	++
Long-Term Effectiveness and Permanence	-	0	++	√+
Reduction of Toxicity, Mobility, or Volume through Treatment	-	-	++	√+
Short-Term Effectiveness	-	0	√+	++
Implementability	++	0	++	++
Cost (\$)				
Capital	\$0	\$344,350	\$1,620,810	\$1,175,610
O&M	\$0	\$6,530	\$6,540	\$4,490
Present Worth	\$0	\$372,620	\$1,649,120	\$1,244,630
<p>Legend= - = Unacceptable 0 = Marginally Acceptable √+ = Acceptable ++ = Acceptable/Best Fit</p>				

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Table 4-6
Summary of Detailed Analysis of Alternatives - Site 4, OU No. 3
RSR Corporation Superfund Site

Evaluation Criteria	Alternative No. 1a: No Action	Alternative No. 1b: Institutional Controls and Monitoring	Alternative No. 2: Removal and Monitoring	Alternative No. 3: Protective Cap, Removal, and Monitoring	Alternative No. 4: Composite Cap, Removal, and Monitoring
Overall Protection of Human Health and the Environment	-	0	++	++	++
Compliance with ARARs	-	-	++	++	++
Long-Term Effectiveness and Permanence	-	0	++	√+	++
Reduction of Toxicity, Mobility, or Volume through Treatment	-	-	++	√+	++
Short-Term Effectiveness	-	0	√+	++	++
Implementability	++	0	++	++	++
Cost (\$)					
Capital	\$0	\$311,260	\$5,958,810	\$3,528,600	\$8,273,880
O&M	\$0	\$4,230	\$4,230	\$3,970	\$5,910
Present Worth	\$0	\$329,570	\$5,977,120	\$3,589,630	\$8,364,730
Legend= - = Unacceptable o = Marginally Acceptable √+ = Acceptable ++ = Acceptable/Best Fit					

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4.2.1.2 Site 1 Alternative No. 1b: Institutional Controls and Monitoring

Alternative No. 1b does not meet the threshold or balancing criteria. This alternative does not reduce environmental exposure and only marginally reduces community exposure. RAOs are not met for any media. Compliance with ARARs, including RCRA and stormwater requirements, will not be achieved.

Since contamination is left in an uncontrolled state, this alternative does not provide long-term effectiveness, permanence, or a reduction of TMV through treatment. Short-term effectiveness is minimal for the community and is not achieved for the environment. This alternative is implementable, however, deed notices and land use restrictions are difficult to obtain and enforce. This alternative has a relatively low cost.

4.2.1.3 Site 1 Alternative No. 2: Removal and Monitoring

Alternative No. 2 meets the threshold criteria. It is protective of human health and the environment by removing slag, battery chips, and metals-contaminated soils that exceed target cleanup goals. RAOs are met for soils, sediments, and surface water. This alternative also complies with ARARs.

Long-term effectiveness and permanence is achieved by this alternative. There is also a reduction of mobility of wastes that are stabilized in a RCRA Subtitle C landfill. The slag, battery chips, and metals-contaminated soils are physically removed from Site 1, but there is no overall reduction of volume or toxicity. Short-term risk to the community may increase during implementation. Dust control measures will be implemented during the excavation to minimize short-term risk. The alternative is implementable and the cost is the highest for the Site 1 alternatives.

4.2.1.4 Site 1 Alternative No. 3: Protective Cap, Removal, and Monitoring

Alternative No. 3 also meets the threshold criteria. It is protective of human health and the environment and also achieves RAOs for all media. The alternative complies with ARARs.

For the balancing criteria, Alternative No. 3 provides moderate long-term effectiveness and permanence by containing slag, battery chips, and metals-contaminated soils. The cap is not permanent and requires long-term monitoring and maintenance. There is a reduction of mobility of the slag, battery chips, and metals-contaminated soils by covering the waste and reducing the potential for infiltration. There is no reduction in toxicity or volume. Short-term risk is minimal during implementation of this alternative. The alternative is implementable and the third lowest cost of all the alternatives for Site 1.

4.2.1.5 Site 1 Alternative No. 4: Composite Cap, Removal, and Monitoring

Alternative No. 4 meets the threshold criteria. It is protective of human health and the environment and also achieves RAOs for all medium. The alternative complies with ARARs.

For the balancing criteria, Alternative No. 4 provides moderate long-term effectiveness and permanence by containing slag, battery chips, metals-contaminated soils, and sediments. The cap is not permanent and requires long-term monitoring and maintenance. There is a reduction of mobility of the slag, battery chips, and metals-contaminated soils by covering the waste and reducing potential for infiltration. There is no reduction in toxicity or volume. Short-term risk is minimal during implementation of this alternative. The alternative is implementable and is in the mid-cost range.

4.2.2 Site 3

4.2.2.1 Site 3 Alternative No. 1a: No Action

Alternative No. 1a does not meet the threshold balancing criteria. It is not protective of human health and the environment since community and environmental exposure is not reduced. RAOs are not met for any of the media. Compliance with ARARs, including RCRA and stormwater requirements, will not be achieved.

Since the contamination is left in an uncontrolled state, this alternative does not provide long-term effectiveness or permanence, reduction of TMV through treatment, or short-term effectiveness. This alternative is implementable and has the lowest cost.

4.2.2.2 Site 3 Alternative No. 1b: Institutional Controls and Monitoring

Alternative No. 1b does not meet the threshold or balancing criteria. This alternative does not reduce environmental exposure and only marginally reduces community exposure. RAOs are not met for any media. Compliance with ARARs, including RCRA and stormwater requirements, will not be achieved.

Since contamination is left in an uncontrolled state, this alternative does not provide long-term effectiveness, permanence, or a reduction of TMV through treatment. Short-term effectiveness is minimal for the community and is not achieved for the environment. This alternative is implementable, however, deed notices and land use restrictions are difficult to obtain and enforce. This alternative has a relatively low cost.

4.2.2.3 Site 3 Alternative No. 2: Removal and Monitoring

Alternative No. 2 meets the threshold criteria. It is protective of human health and the environment by removing slag, battery chips, and metals-contaminated soils that exceed target cleanup goals. RAOs are met for soils, sediments, and surface water. This alternative also complies with ARARs.

Long-term effectiveness and permanence is achieved by this alternative. There is also a reduction of mobility of wastes that are stabilized in a RCRA Subtitle C landfill. The slag, battery chips, and metals-contaminated soils are physically removed from Site 3, but there is no overall reduction of volume or toxicity. Short-term risk to the community may increase during implementation. Dust control measures will be implemented during the excavation to minimize short-term risk. The alternative is implementable and the cost is in the mid-range.

4.2.2.4 Site 3 Alternative No. 3: Excavation, Surface Controls, Containment, and Monitoring

Alternative No. 3 also meets the threshold criteria. It is protective of human health and the environment and also achieves RAOs for all media. The alternative complies with ARARs.

For the balancing criteria, Alternative No. 3 provides moderate long-term effectiveness and permanence by containing slag, battery chips, and metals-contaminated soils. The cap is not permanent and requires long-term monitoring and maintenance. There is a reduction of mobility of the slag, battery chips, and metals-contaminated soils by covering the waste and reducing potential for infiltration. There is no reduction in toxicity or volume. Short-term risk is minimal during implementation of this alternative. The alternative is implementable and in the high-cost range.

4.2.3 Site 4

4.2.3.1 Site 4 Alternative No. 1a: No Action

Alternative No. 1a does not meet the threshold balancing criteria. It is not protective of human health and the environment since community and environmental exposure is not reduced. RAOs are not met for any of the media. Compliance with ARARs, including RCRA and stormwater requirements, will not be achieved.

Since the contamination is left in an uncontrolled state, this alternative does not provide long-term effectiveness or permanence, reduction of TMV through treatment, or short-term effectiveness. This alternative is implementable and has the lowest cost.

4.2.3.2 Site 4 Alternative No. 1b: Institutional Controls and Monitoring

Alternative No. 1b does not meet the threshold or balancing criteria. This alternative does not reduce environmental exposure and only marginally reduces community exposure. RAOs are not met for any media. Compliance with ARARs, including RCRA and the stormwater requirements, will not be achieved.

Since contamination is left in an uncontrolled state, this alternative does not provide long-term effectiveness, permanence, or a reduction of TMV through treatment. Short-term effectiveness is minimal for the community and is not achieved for the environment. This alternative is implementable, however, deed notices and land use restrictions are difficult to obtain and enforce. This alternative has a relatively low cost.

4.2.3.3 Site 4 Alternative No. 2: Removal and Monitoring

Alternative No. 2 meets the threshold criteria. It is protective of human health and the environment by removing slag, battery chips, and metals-contaminated soils that exceed target cleanup goals. RAOs are met for soils, sediments, and surface water. This alternative also complies with ARARs.

Long-term effectiveness and permanence is achieved by this alternative. There is also a reduction of mobility of wastes that are stabilized in a RCRA Subtitle C landfill. The slag, battery chips, and metals-contaminated soils are physically removed from Site 4, but there is no overall reduction of volume or toxicity. Short-term risk to the community may increase during implementation. Dust control measures will be implemented during the excavation to minimize short-term risk. The alternative is implementable and the cost is in the high range.

4.2.3.4 Site 4 Alternative No. 3: Protective Cap, Removal, and Monitoring

Alternative No. 3 also meets the threshold criteria. It is protective of human health and the environment and also achieves RAOs for all media. The alternative complies with ARARs.

For the balancing criteria, Alternative No. 3 provides moderate long-term effectiveness and permanence by containing slag, battery chips, and metals-contaminated soils. The cap is not permanent and requires long-term monitoring and maintenance. Long-term effectiveness and permanence are achieved for the excavated soils at the Jaycee Park. There is a reduction of mobility of the slag, battery chips, and metals-contaminated soils by covering the waste and reducing potential for infiltration. There is no reduction in

toxicity or volume. Short-term risk is minimal during implementation of this alternative. The alternative is implementable and lower cost than Alternatives 2 and 4 for Site 4.

4.2.3.5 Site 4 Alternative No. 4: Composite Cap, Removal, and Monitoring

Alternative No. 4 meets the threshold criteria. It is protective of human health and the environment and also achieves RAOs for all media. The alternative complies with ARARs.

For the balancing criteria, Alternative No. 4 provides moderate long-term effectiveness and permanence by containing slag, battery chips, and metals-contaminated soils. The cap is not permanent and requires long-term monitoring and maintenance. Long-term effectiveness and permanence are achieved for the excavated soils at the Jaycee Park. There is a reduction of mobility of the slag, battery chips, and metals-contaminated soils by covering the waste and reducing the potential for infiltration. There is no reduction in toxicity or volume. Short-term risk is minimal during implementation of this alternative. The alternative is implementable and is in the highest cost of all the alternatives.

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Section 5 References

5.0 References

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Appendix A ARARs Summary Tables

<p align="center">Table A-1 Solid Waste ARARs Evaluation RSR Corporation Superfund Site OU No. 3</p>			Page 1 of 11
Requirement	ARAR?	Justification	
1. Chemical-Specific ARARs			
State			
Groundwater Protection Design and Operation Subchapter H 30 TAC § 330.200(a)(1)	Yes	The requirements specify that new municipal solid waste landfill facility units and lateral expansions need to be designed such that the concentration values listed in Table 2 will not be exceeded in the uppermost aquifer at the relevant point of compliance. The values are relevant and appropriate to OU No. 3.	
Constituents for Detection Monitoring Subchapter I 30 TAC § 330.241	Yes	This section identifies 47 volatile organic chemicals and 15 metals for which detection monitoring is required under 30 TAC § 330.234. Depending on the remedial action selected for the landfills at OU No. 3, this constituent list may be relevant and appropriate.	
1. Action-Specific ARARs			
Federal			
40 C.F.R. Part 241 Guidelines for the Land Disposal of Solid Wastes	Yes	Establishes minimum levels of performance required of any solid waste land disposal site operation. Requirements are relevant and appropriate to conditions at OU No. 3 landfills.	
40 C.F.R. Part 257 Criteria for Classification of Solid Waste Disposal Facilities and Practices	Yes	Establishes criteria for use in determining which solid waste disposal facilities and practices pose a reasonable probability of adverse effects on health or the environment and thereby constitute prohibited open dumps. The landfill cover requirements stated in these regulations are relevant and appropriate to landfills at OU No. 3.	
40 C.F.R. Part 258 Regulations Concerning Municipal Solid Waste Landfills	Yes	Established design and operational criteria for all new municipal solid waste landfills or expansions of existing facilities. The requirements vary depending on the time frame that the land disposal unit is used. The provisions include closure and post-closure care. Landfill cover requirements are relevant and appropriate since waste was not received after October 9, 1991.	

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Table A-1
Solid Waste ARARs Evaluation
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Requirement	ARAR?	Justification
40 C.F.R. Part 260-261 Identification and Listing of Hazardous Waste	Yes	Defines those solid wastes that are subject to regulation as hazardous wastes under 40 C.F.R. Parts 262-265, and Parts 124, 270, 271. The State of Texas has an approved delegated program for this portion of RCRA. The regulations are applicable for purposes of determining whether any of the materials disposed of are hazardous wastes for purposes of any remedial actions taken under CERCLA. Materials may also be compared to the waste listings to determine whether any of the materials are sufficiently similar such that RCRA regulations are relevant and appropriate.
OSHA Worker Protection 29 C.F.R. 1910.120	Yes	Applicable to OU No. 3 regarding protection of workers at site.
State		
Applicability Subchapter A 30 TAC § 330.3(a) and (b)	Yes	Subsection (a) applies to all persons involved in any aspect of the management and control of municipal solid waste including, but not limited to, storage, collection, handling, transportation, processing and disposal. Subsection (b) notes that for municipal solid waste landfills that stopped receiving waste before October 9, 1991 only the provisions of 30 TAC 330.251 (relating to closure requirements) apply. Both subsections (a) and (b) are applicable. As noted in the following, all other provisions of the regulation are either relevant and appropriate or not ARARs except for closure requirements established under 30 TAC 330.251, 330.254(a), and 330.255.
Permit Required Subchapter A 30 TAC § 330.4(a)	No	Establishes requirements for permits for storage, processing, removal, or disposal of any municipal solid waste. This requirement is not an ARAR as a permit is not required for CERCLA actions.
General Prohibitions Subchapter A 30 TAC § 330.5(a)	Yes	Section (a) specifies that the collection, storage, transportation, processing, or disposal of municipal solid waste, or the use or operation of a solid waste facility to store, process, or dispose of solid waste, in a manner that causes: (1) the discharge or imminent threat of discharge of municipal solid waste into or adjacent to the waters in the state without obtaining specific authorization, (2) the creation and maintenance of a nuisance, or (3) the endangerment of human health and welfare or the environment. This requirement is relevant and appropriate.

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Table A-1
Solid Waste ARARs Evaluation
RSR Corporation Superfund Site OU No. 3

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Requirement	ARAR?	Justification
General Prohibitions Subchapter A 30 TAC § 330.5(e)(1), (e)(4), e(5), e(7), e(8)	Yes	Section (e)(1) prohibits disposal of lead acid storage batteries at municipal solid waste landfills. Section (e)(4) prohibits the disposal of whole used or scrap tires. Section (e)(5) prohibits the disposal of refrigerators, freezers, air conditioners, and any other items containing chlorinated fluorocarbons (CFCs), unless the CFCs have been removed and disposed of at an approved facility. If the CFCs have not been removed, the whole item must be sent to an approved CFC disposal facility. Section (e)(7) prohibits the disposal of regulated hazardous waste as defined in Section 330.2 in a municipal solid waste facility. Section (e)(8) prohibits the disposal of polychlorinated biphenyls in a municipal solid waste facility. All of these provisions are relevant and appropriate to RSR OU No. 3.
Deed Recordation Subchapter A 30 TAC § 330.7	Yes	Requires that, upon completion of the disposal operation and final closure of the facility or site, that the owner/operator file an "Affidavit to the Public" that restricts the future use of the land in accordance with Section 330.253(e)(8) (Closure Requirements for Municipal Solid Waste Landfill Units that Receive Waste on or after October 9, 1993). This requirement is relevant and appropriate to RSR OU No. 3.
Types of Municipal Solid Waste Facilities; Subchapter D 30 TAC § 330.41	No	This requirement outlines the classifications of municipal solid waste facilities. This provision is not an ARAR as the landfills located within OU No. 3 are closed and unlikely to reopen.
Permit Procedures Subchapter E 30 TAC § 330.5	No	This subchapter outlines the permit procedures associated with legally permitting a solid waste management facility. Because no permits are required for actions taken under CERCLA, these provisions are not ARARs for OU No. 3.
Operational Standards for Solid Waste Land Disposal Sites Subchapter F 30 TAC § 330.100	No	This subchapter establishes requirements for operational procedures including complying with a Site Development Plan, Site Operating Plan, Final Closure Plan, Post-Closure Maintenance Plan, Landfill Gas Management Plan, and all other documents and plans required by this subchapter. These requirements are not ARARs for the RSR OU No. 3 site.
Access Control Subchapter F 30 TAC § 330.116	Yes	These provisions require that public access be controlled by use of artificial barriers, natural barriers, or both, to protect human health and safety and the environment. These provisions are relevant and appropriate to OU No. 3.
Disposal of Large Items Subchapter F 30 TAC § 330.124	Yes	Large items (household appliances) should be recycled if they cannot be incorporated into the solid waste operation. The items should be removed from the site to prevent these items from becoming a nuisance and to preclude the discharge of any pollutants from the area. This requirement is relevant and appropriate if remedial actions at the site require some action relative to large items disposed of at the site.

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Table A-1
Solid Waste ARARs Evaluation
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Requirement	ARAR?	Justification
Air Criteria Subchapter F 30 TAC § 330.125	Yes	Requires compliance with the State Implementation Plan regarding releases to air; also requires that ponded water be controlled to avoid development of objectionable odors and requires implementation of appropriate control measures should odors develop. These provisions are relevant and appropriate if remedial actions taken at the site involve disturbances resulting in air releases or situations resulting in ponded water.
Endangered Species Protection Subchapter F 30 TAC § 330.129	No	Prohibits a facility from destructing or modifying the critical habitat of endangered or threatened species, or cause or contribute to the taking of any endangered or threatened species. This requirement is not an ARAR as no critical habitat of endangered or threatened species has been identified at the site.
Landfill Gas Control Subchapter F 30 TAC § 330.130	Yes	Requires that all landfill gases be monitored in accordance with an approved Landfill Gas Management Plan. The provision is relevant and appropriate to landfills on OU No. 3. A Management Plan would not be required under CERCLA, however, the requirements would need to be incorporated to a remedial action.
Abandoned Oil and Water Wells Subchapter F 30 TAC § 330.131	Yes	Requires that all abandoned oil and water wells situated within the site be capped, plugged, and closed in accordance with all applicable rules and regulations. These provisions are relevant and appropriate if abandoned oil and/or water wells are discovered on the OU No. 3 site in the vicinity of the landfills.
Ponded Water Subchapter F 30 TAC § 330.134	Yes	This provision requires action be taken to mitigate ponded water over waste on a solid waste management unit, open or closed. These requirements are relevant and appropriate if ponded water develops at the landfills located in OU No. 3, either before or as a result of any remedial actions.
Disposal of Special Wastes Subchapter F 30 TAC § 330.136	No	Allows disposal of a number of special wastes including dead animals, untreated medical wastes, regulated asbestos-containing material, empty pesticide containers, municipal hazardous waste from a conditionally exempt small quantity generator, used-oil filters, etc. These provisions are not ARARs because the landfills are no longer in operation.
Disposal of Industrial Wastes Subchapter F 30 TAC § 330.137	No	Establishes specific requirements for disposal of Class I industrial solid waste. Not an ARAR for OU No. 3 because the landfills no longer operate and accept waste for disposal.
Operational Standards for Solid Waste Processing, and Experimental Sites Subchapter G 30 TAC § 330.150	No	The landfills associated with OU No. 3 are no longer operational and are not solid waste processing or experimental sites. Provisions in Subchapter G are not ARARs for OU No. 3.

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Table A-1
Solid Waste ARARs Evaluation
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Requirement	ARAR?	Justification
Groundwater Protection Design and Operation Subchapter H 30 TAC § 330.201	Yes	This section establishes requirements for the use of leachate collection and associated leachate-removal systems for landfills. The provisions specific to leachate collection and removal are relevant and appropriate to the landfills at OU No. 3 in situations where documentation exists to substantiate the generation of leachate.
Groundwater Protection Design and Operation Subchapter H 30 TAC § 330.202 through 330.206	No	The requirements outlined in these sections pertain to construction specifications for liners and location relative to geologic faults. The landfills located in OU No. 3 are no longer operational; consequently these design specifications are not ARARs.
Groundwater Monitoring and Corrective Action Subchapter I 30 TAC § 330.230	Yes	The requirements established for groundwater monitoring are relevant and appropriate to landfills located in OU No. 3. Groundwater monitoring is required throughout the active life and post-closure care period of the municipal solid waste landfill unit.
Groundwater Monitoring Systems Subchapter I 30 TAC § 330.231	Yes	These provisions require installation of a groundwater monitoring system that consists of a sufficient number of wells at appropriate location and depth to yield representative groundwater samples from the uppermost aquifer. This includes installation of background wells. These requirements are relevant and appropriate for the landfills located in OU No. 3.
Groundwater Sampling and Analysis Requirements Subchapter I 30 TAC § 330.233	Yes	Requirements in this section identify data needs associated with groundwater monitoring: water level measurements, sampling and analytical methods, and the associated quality assurance/quality control processes to be used as part of monitoring. These requirements are relevant and appropriate for groundwater monitoring conducted for the landfills at OU No. 3.
Detection Monitoring Program Subchapter I 30 TAC § 330.234	Yes	Based on these provisions, detection monitoring is required at municipal solid waste landfill units from all groundwater monitoring wells. Detection monitoring is required on at least a semiannual basis during the active life of the facility and the closure and post-closure care period. These requirements are relevant and appropriate to the landfills located in OU No. 3.
Assessment Monitoring Program Subchapter I 30 TAC § 330.235	Yes	The provisions adopt 40 CFR Part 258, Appendix II by reference and indicate that if a statistically significant change from background has been detected for one or more constituents listed in 30 TAC § 330.241(d) or an alternative list, that assessment monitoring is required. Depending on the remedial action selected for the landfills located in OU No. 3, these requirements are relevant and appropriate.
Assessment of Corrective Measures Subchapter I 30 TAC § 330.236	Yes	This section identifies the need to evaluate possible corrective action measures for mitigating statistically significant levels of constituents exceeding the groundwater protection standards. Depending on the remedial action selected for the landfills, these requirements are relevant and appropriate.

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Table A-1
Solid Waste ARARs Evaluation
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Requirement	ARAR?	Justification
Selection of Remedy Subchapter I 30 TAC § 330.237	Yes	This section outlines the criteria for selecting a remedy in order to satisfy the following: protective of human health and environment; attain groundwater protection standards; control releases so as to reduce or eliminate further releases; and comply with standards for management of wastes as specified in 30 TAC § 330.238(d). These requirements are relevant and appropriate depending on the nature and extent of groundwater contamination attributable to the landfills and depending on the remedial action selected.
Implementation of the Corrective Action Program Subchapter I 30 TAC § 330.238	Yes	This section outlines the criteria for initiation and completion of remedial activities. The requirements are relevant and appropriate in so much that some remedial action is required to address groundwater contamination resulting from the landfills located on OU No. 3.
Groundwater Monitoring at Type IV Landfills Subchapter I 30 TAC § 330.239 Groundwater Monitoring at Other Types of Landfills and Facilities Subchapter I 30 TAC § 330.240	No	Requirements included in these sections address groundwater monitoring at Type IV landfills which include those classified for the disposal of brush, construction-demolition waste, and/or rubbish that are free of putrescible and household wastes, and landfills otherwise not classified as Type I. These requirements are not ARARs for OU No. 3 landfills because the landfills accepted municipal solid waste materials. Groundwater monitoring requirements included elsewhere in Subchapter I are more appropriate to the situation than those specified in this section.
Monitor Well Construction Specifications Subchapter I 30 TAC § 330.242	Yes	Specifications are provided by drilling; casing, screen, filter pack and seals; development; location and elevation; and plugging and abandonment. These specifications are relevant and appropriate in so much as any remedial actions taken at the site require the installation of additional monitoring wells.
Closure Requirements for Municipal Solid Waste Landfill Units That Stop Receiving Waste Prior to October 9, 1991, and Municipal Solid Waste Sites Subchapter J 30 TAC § 330.251	Yes	This section establishes specific procedures and requirements for proper closure. Specific requirements are included for: final cover system; final six inches of cover; side slopes of the final cover; and the schedule for submitting design and specifications for the closure. These requirements are applicable to the landfills at OU No. 3 which stopped receiving wastes prior to the stated deadline. Remedial actions which address cover requirements will need to comply the provisions of this section.

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Table A-1
Solid Waste ARARs Evaluation
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Requirement	ARAR?	Justification
Closure Requirements for Municipal Solid Waste Landfill Units That Receive Waste on or after October 9, 1991, But Stop Receiving Waste prior to October 9, 1993 and Closure Requirements for Municipal Solid Waste Landfill Units that Receive Waste on or after October 9, 1993, and Municipal Solid Waste Sites Subchapter J 30 TAC §§ 330.252 and 330.253	No	These requirements are not ARARs as the provisions specified in 30 TAC § 330.251 are applicable and address closure requirements specific to the landfill relative to the date of operation and cessation of disposal activities.
Post-Closure Care Maintenance Requirements Subchapter J 30 TAC § 330.254(a)	Yes	Section (a) of this provision applies specifically to post-closure care maintenance requirements for municipal solid waste landfill units closing prior to October 9, 1993 and municipal solid waste sites. Requirements of this section include: retainage of the right-of-way in for a minimum of 5 years; correct cover material and erosion of cover material; and continue monitoring programs implemented during operation. These requirements are applicable to the post-closure care of the landfills located in OU No. 3.
Post-Closure Land Use Subchapter J 30 TAC § 330.255	Yes	These provisions establish limitations on proposed construction activities or structural improvements located on closed municipal solid waste landfill units or municipal solid waste sites. Section (b)(1) of the provisions require that any proposed construction activities or structural improvements not disturb the integrity and function of the final cover, any liner(s), all components of the containment system(s), and any monitoring system(s). These provisions and others included in the citation are applicable to the landfills located in OU No. 3 depending on remedial actions that may be taken that would require disturbance of the in-place systems.
Completion of Post-Closure Care Maintenance Subchapter J 30 TAC § 330.256	No	This section specifies the requirement for submitting documentation verifying the post-closure care maintenance has been completed in accordance with the approved post-closure plan. This requirement is not an ARAR for the landfills located in OU No. 3 because CERCLA actions taken at the site would not require formal certification of completion under this section.

<p align="center">Table A-1 Solid Waste ARARs Evaluation RSR Corporation Superfund Site OU No. 3</p>			Page 8 of 11
Requirement	ARAR?	Justification	
Solid Waste Technician Training and Certification Program Subchapter M 30 TAC §§ 330.381-303.391	No	These provisions deal with procedures for training and certifying landfill operation employees. The requirements provide no substantive requirements relative to CERCLA activities and are therefore not ARARs for OU No. 3.	
Guidelines for Regional and Local Solid Waste Management Plans Subchapter O 30 TAC §§ 330.561-303.568	No	These provisions address the need for regional planning activities for solid waste management purposes. The requirements provide no substantive requirements relative to CERCLA activities and are therefore not ARARs for OU No. 3.	
Fees and Reports for Facilities Subchapter P 30 TAC §§ 330.601-330.700	No	These provisions outline reporting requirements for municipal solid waste landfill units and other related operations. The requirements provide no substantive requirements relative to CERCLA activities and are therefore not ARARs for OU No. 3.	
Memoranda of Agreement and Joint Rules with Other Agencies Subchapter Q 30 TAC §§ 330.701-330.733	No	Provisions included in Subchapter Q address permitting requirements and compliance with regulations enforced by agencies other than TNRCC. The requirements outlined in this Subchapter are administrative and are therefore not ARARs for OU No. 3.	
Management of Whole Used or Scrap Tires Subchapter R 30 TAC §§ 330.801-303.889	No	Subchapter R includes detailed regulations for whole used or scrap tires—generation, storage, and transportation. Provisions included in Subchapter R are not ARARs as the landfills associated with OU No. 3 were not specifically designed nor were operated as tirehandling facilities. Tires observed at the landfills in OU No. 3 were disposed as part of historical practices or as illegally disposed materials (open dumping). Subchapter R does not contain substantive requirements for handling tires disposed of under conditions present at OU No. 3.	
Assistance Grants and Contract Subchapter S 30 TAC §§ 330.890-330.897	No	Subchapter S does not contain substantive requirements related to CERCLA activities associated with the former municipal solid waste landfill operations. The requirements outlined in Subchapter S are administrative and are therefore not ARARs for OU No. 3.	

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<p align="center">Table A-1 Solid Waste ARARs Evaluation RSR Corporation Superfund Site OU No. 3</p>			Page 9 of 11
Requirement	ARAR?	Justification	
Management of Whole Used or Scrap Tires or Shredded Tire Pieces Subchapter X 30 TAC §§ 330.900-330.938	No	Tires observed at the landfills in OU No. 3 were disposed as part of historical practices or as illegally disposed materials (open dumping). Subchapter X does not contain substantive requirements for handling tires disposed of under conditions present at OU No. 3.	
Use of Land Over Closed Municipal Landfills Subchapter T 30 TAC §§ 330.951-330.963	Yes	These requirements establish standards for development and construction over closed landfills. The rules apply to owners and lessees of property overlying closed landfills, registered professional engineers, local government officials with the authority to disapprove an application for development, developers of property greater than 1 acre, and developers of an enclosed structure greater than 1 acre. Some requirements do not apply to persons constructing or owning single-family homes or duplexes or other enclosed structures. Section 330.953 requires a soil test be performed on land greater than 1 acre to determine if the tract overlies a closed landfill. Section 330.954 establishes permit and registration requirements, procedures and processing. Section 330.955 lists prohibitions for the development of land over a closed municipal solid waste landfill. A developer cannot damage the final cover or the liner without written consent of the executive director unless the damage occurs constructed below the natural grade of the land or the final cover. Sections 330.956 through 330.963 establish procedural requirements relative to permitting, reporting, recordkeeping, and public notifications. The requirements of these provisions are relevant and appropriate for the OU No. 3 if remedial actions undertaken at the landfills require construction of building directly on top of a closed landfill, with the exception of the permitting requirements which would not be ARARs for actions implemented under CERCLA.	
Generators of Medical Waste Subchapter Y 30 TAC § 330.1004	Yes	This section establishes standards for generators of medical wastes. These include: record keeping; treatment testing procedures; disposal requirements. Requirements for disposal [1004(d)(4)] is relevant and appropriate for handling and disposal of sharps identified at the landfills at OU No. 3.	
Transporters of Medical Waste Subchapter Y 30 TAC § 330.1005	Yes	This section establishes standards for transporters transporting medical wastes to offsite storage, treatment, or disposal facilities. Requirements of this section are relevant and appropriate for medical wastes on OU No. 3 that are sent offsite for disposal.	
Disposal of Batteries 30 TAC § 330.1103	Yes	This section specifies that used lead-acid batteries may not be placed with mixed municipal solid waste or otherwise disposed of except as according to these regulations. These requirements are relevant and appropriate to the landfills at OU No. 3 if lead-acid batteries are discovered during the course of CERCLA-related actions at the site.	

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Table A-1
Solid Waste ARARs Evaluation
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Requirement	ARAR?	Justification
3. Location Specific		
State		
Easements and Buffer Zones Subchapter F 30 TAC § 330.121	Yes	Prohibits solid waste management activities within easements, buffer zones, or rights-of-way that cross the site; prohibits disposal within 25 feet of the center line of any utility line or pipeline easement without approval. A minimum of 50 feet must be maintained between solid waste processing and disposal activities and the site boundary unless otherwise approved. These requirements are relevant and appropriate if remedial actions at the site require modification or construction related to the landfills.
Airport Safety Subchapter L 30 TAC § 330.300	No	Specifies necessary actions if landfill units or lateral expansions are located near airport runways under specific operating conditions. Subsection 300(d) of these requirements indicate that disposal of wastes shall not be located in areas where the attraction of birds can cause a significant bird hazard to low-flying aircraft and that all sites within 5 miles of an airport be critically evaluated to determine if an incompatibility exists. These requirements are not ARARs because airport runways are within 5 miles of OU No. 3.
Floodplains Subchapter L 30 TAC § 330.301	Yes	These provisions apply to new municipal solid waste landfill units, existing units, and lateral expansions located in a 100-year floodplain. These units must not restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain, or result in washout of solid waste. These provisions are ARARs if remedial activities result in construction or modifications impacting a floodplain.
Wetlands Subchapter L 30 TAC § 330.302	Yes	These provisions specify that a municipal solid waste landfill unit shall not cause or contribute to significant degradation of wetlands. This includes preventing adverse impacts on fish, wildlife, and other aquatic resources and their habitat from release of the solid waste. Subsection 302(2)(A) through (C) includes requirements that the construction and operation of the landfill unit shall not result in violations of the State waste quality standards, toxic effluent standards of the Clean Water Act, and jeopardize the continued existence of endangered or threatened species or result in loss or destruction of habitat. The requirements under this section are relevant and appropriate; remedial actions taken at the site that impact the wetlands will need to address these requirements.
Fault Areas Subchapter L 30 TAC § 330.303	No	Specifies design criteria for landfill units within 200 feet of a fault that has had displacement in Holocene time. These requirements are not ARARs as this geologic setting is not present at OU No. 3.
Seismic Impact Zones Subchapter L 30 TAC § 330.304	No	Restricts the location of new landfill units and lateral expansions in seismic impact zones. This requirement is not an ARAR as seismic impact zones have not been identified at OU No. 3.

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Table A-1 Solid Waste ARARs Evaluation RSR Corporation Superfund Site OU No. 3			Page 11 of 11
Requirement	ARAR?	Justification	
Unstable Areas Subchapter L 30 TAC § 330.305	No	Specifies engineering design criteria for landfill units or expansions located in unstable areas. These requirements are not ARARs because unstable areas have not been documented in the OU No. 3 area.	

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Table A-2 Solid Waste Contaminant-Specific ARARs RSR Corporation Superfund Site OU No. 3	
Parameter	R&A¹ (mg/L)
Arsenic	0.05
Barium	1
Benzene	0.005
Cadmium	0.01
Carbon tetrachloride	0.005
Chromium (hexavalent)	0.05
2,4-D	0.1
1,4-Dichlorobenzene	0.075
1,2-Dichloroethane	0.005
1,1-Dichloroethylene	0.007
Endrin	0.0002
Fluoride	4
Lindane	0.004
Lead	0.05
Mercury	0.002
Methoxychlor	0.1
Nitrate	10
Selenium	0.01
Silver	0.05
Toxaphene	0.005
1,1,1-Trichloroethane	0.2
Trichloroethylene	0.005
2,4,5-T	0.01
Vinyl chloride	0.002
¹ Design Criteria; 30 TAC 330.200; Subchapter H--Groundwater Protection Design and Operation	

Table A-3
Solid Waste Contaminant-Specific ARARs
Constituents for Groundwater Detection Monitoring
RSR Corporation Superfund Site OU No. 3

R&A¹ Inorganic^a Parameter	R&A¹ Organic Parameter	
Antimony	Acetone	trans-1,3-Dichloropropene
Arsenic	Acrylonitrile	Ethylbenzene
Barium	Benzene	2-Hexanone
Beryllium	Bromochloromethane	Methyl bromide
Cadmium	Bromodichloromethane	Methyl chloride
Chromium	Bromoform	Methylene bromide
Cobalt	Carbon disulfide	Methylene chloride
Copper	Carbon tetrachloride	Methyl ethyl ketone
Lead	Chlorobenzene	Methyl iodide
Nickel	Chloroethane	4-Methyl-2-pentanone
Selenium	Chloroform	Styrene
Silver	Dibromochloromethane	1,1,1,2-Tetrachloroethane
Thallium	1,2-Dibromo-3-chloropropane	1,1,2,2-Tetrachloroethane
Vanadium	1,2-Dibromomethane	Tetrachloroethylene
Zinc	o-Dichlorobenzene	Toluene
	p-Dichlorobenzene	1,1,1-Trichloroethane
	trans-1,2-Dichloro-2-butene	1,1,2-Trichloroethane
	1,1-Dichloroethane	Trichloroethylene
	1,2-Dichloroethane	Trichlorofluoromethane
	1,1-Dichloroethylene	1,2,3-Trichloropropane
	cis-1,2-Dichloroethylene	Vinyl acetate
	trans-1,2-Dichloroethylene	Vinyl chloride
	1,2-Dichloropropane	Xylenes
	cis-1,3-Dichloropropene	

^aTotal constituents.

Subchapter I--Constituents for Detection Monitoring; 30 TAC 330.241.

Table A-4
Soils or Solid Media ARARs
RSR Corporation Superfund Site OU No. 3

Page 1 of 11

Requirement	ARAR?	Justification
1. Contaminant-Specific ARARs		
Federal		
Risk-based preliminary remediation goals (PRGs) [Risk Assessment Guidance for Superfund (RAGS), Part B]	TBC	Risk-based PRGs calculated using RAGS Part B are TBC for OU No. 3.
National Contingency Plan 40 C.F.R. Part 300.430(d) Baseline Human Health Risk Assessment	Yes	Applicable to OU No. 3. Evaluates baseline human health risk due to current and potential future site exposures, and establishes contaminant levels in environmental media at the OUs for protection of public health.
Office of Solid Waste and Emergency Response (OSWER) Directive 9355.4-12 July 14, 1994	TBC	The directive establishes soil cleanup levels for lead abatement for residential areas. These levels are TBCs for OU No. 3.
EPA—Strategy for Reducing Lead Exposures, October 3, 1990	TBC	TBC for OU No. 3. The strategy was developed to reduce lead exposures to the greatest extent possible. Goals of the strategy are to: (1) significantly reduce blood lead incidences above 10 µg/dL in children and (2) reduce the amount of lead introduced into the environment.
Class 1 Waste Determination Subchapter R 30 TAC § 335.505	Yes	This section specifies the requirements for identifying if a nonhazardous industrial solid waste is a Class 1 waste, which is defined as a waste that contains specific constituents which equal or exceed the levels listed in Table 5. These provisions are applicable to OU No. 3.
Attainment of Risk Reduction Standard Number 1: Closure/Remediation to Background Subchapter S 30 TAC § 335.554	No	These provisions specify that, to meet Risk Reduction Standard Number 1, closure and/or remediation must meet background levels or practical quantitation limits if the practical quantitation limit exceeds background. These provisions would be relevant and appropriate if Risk Reduction Standard Number 1 were the preferred standard; however, it is unlikely that cleanup goals will be set at background levels.
Attainment of Risk Reduction Standard Number 2: Closure/Remediation to Health-Based Standards and Criteria Subchapter S 30 TAC § 335.555	Yes	Subsection (a) specifies that the concentration of a contaminant in contaminated media of concern such as groundwater, surface water, air or soil shall not exceed the cleanup levels as defined in § 335.556 (relating to Determination of Cleanup Levels for Risk Reduction Standard Number 3). If the practical quantitation limit and/or background concentration is greater than the cleanup level, the greater of the practical quantitation limit or background shall be used for determining compliance with the requirements of this section. These provisions are relevant and appropriate to development of contaminant-specific cleanup goals for OU No. 3.

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Table A-4
Soils or Solid Media ARARs
RSR Corporation Superfund Site OU No. 3

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Requirement	ARAR?	Justification
1. Contaminant-Specific ARARs (Continued)		
Federal (Continued)		
Determination of Cleanup Levels for Risk Reduction Standard Number 2 Subchapter S 30 TAC § 335.556	Yes	Specifies that for purposes of risk reduction, cleanup levels for individual contaminants are represented by Texas or federal promulgated health-based standards, or when these are not available or do not provide appropriate protection, then cleanup levels based on procedures specified for determining other numeric criteria (Medium-Specific Concentration or MSC) are required to be developed. These provisions are relevant and appropriate to OU No. 3.
Criteria for Selection of Non-residential Soil Requirements for Risk Reduction Standard Number 2 Subchapter S 30 TAC § 335.557	Yes	Specifies the conditions under which soil requirements can deviate from residential soil requirements. Subsection (1) notes that for property located within the jurisdictional area of a zoning authority, documentation may be provided to demonstrate that the property is zoned for commercial or industrial use. This requirement is relevant and appropriate for OU No. 3 to the extent that current zoning is relied upon to predict future land uses.
Medium Specific Concentrations for Risk Reduction Standard Number 2 Subchapter S 30 TAC § 335.558	Yes	Subsections (b) through (d) of this section specify the methods for calculating medium specific concentrations for ingestion of surface water and groundwater, and soil ingestion along with inhalation of volatiles and particulates. These provisions are relevant and appropriate to setting contaminant-specific cleanup levels/goals for OU No. 3.
Medium Specific Requirements and Adjustments for Risk Reduction Standard Number 2 Subchapter S 30 TAC § 335.559	Yes	Subsections (b) through (h) specify requirements that can define or modify numeric cleanup levels such as media-specific concentrations or require non-health based criteria to be addressed. These provisions are relevant and appropriate to establishing cleanup goals for OU No. 3.
2. Action-Specific ARARs		
Federal		
40 CFR 268 Land Disposal Restrictions	Yes	40 C.F.R. Part 268 establishes restrictions on land disposal of specific wastes unless treatment standards are met. Applicable to OU No. 3, if the wastes are removed from the site for subsequent disposal. Metals wastes in soil that are hazardous by toxicity characteristic are exempt from this rule. The Universal Treatment Standards (UTS) establish a concentration limit for 300 regulated constituents in soil regardless of waste type.
40 C.F.R. Part 264 Subparts B, C, D and G Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	Yes	Subparts B, C, and D establish minimum standards which define the acceptable management of hazardous waste for owners and operators of facilities that treat, store, or dispose of hazardous waste. Subpart G establishes standards for closure and post-closure care for site design and operation. These requirements are applicable for wastes identified as RCRA hazardous wastes and relevant and appropriate if sufficiently similar.

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Table A-4
Soils or Solid Media ARARs
RSR Corporation Superfund Site OU No. 3

Page 3 of 11

Requirement	ARAR?	Justification
2. Action-Specific ARARs (Continued)		
Federal (Continued)		
40 C.F.R. Part 264 Subparts I and J Standards for Container and Tank Storage of Hazardous Waste	Yes	Subpart I sets operating and performance standards for container storage of hazardous waste. Subpart J outlines similar standards, but applies to tanks rather than containers. These requirements are applicable for RCRA hazardous wastes on OU No. 3 if containers are used for onsite storage of liquids, soil, or other wastes as part of the remedial action, or relevant and appropriate if sufficiently similar.
40 C.F.R. Part 264 Subparts L and N Standards for Waste Piles and Landfills	Yes	Subpart L sets design and operating requirements for the storage or treatment of wastes in piles. If the waste piles are closed with wastes left in place, Subpart L requirements are applicable and must be met. Subpart N establishes construction, design, performance, closure, and operation requirements pertaining to Subtitle C landfills. Subpart L and/or N are applicable for RCRA hazardous wastes on OU No. 3 if onsite treatment, storage, or disposal in piles or Subtitle C landfills is included as part of the remedial action, and relevant and appropriate if sufficiently similar to hazardous waste.
40 C.F.R. Part 264 Subpart S Corrective Action Management Units	Yes	The promulgated portion of Subpart S addresses the corrective action management unit (CAMU) and temporary unit (TU) aspects of RCRA corrective action. A CAMU is a contiguous area within a facility in which remedial wastes generated during corrective action are managed. A CAMU may include uncontaminated areas where necessary to achieve overall remedial goals. Wastes may be moved from one CAMU to another within the facility without triggering land disposal restrictions (LDRs). Wastes can also be removed from the CAMU, treated in a unit, and returned to the CAMU without triggering LDRs. A TU can be used to manage wastes for up to 1 year. TUs are not subject to the full permitting requirements of a fully regulated RCRA unit and waste piles are not eligible for TUs. Subpart S requirements are applicable for RCRA hazardous wastes on OU No. 3 if the remedial action requires wastes to be managed in an onsite CAMU or TU, and relevant and appropriate if sufficiently similar to hazardous waste.
40 C.F.R. Part 264 Subpart X (Miscellaneous Units)	Yes	Relates to "miscellaneous" units that treat, store, or dispose hazardous wastes. Provides general performance standards for location, design, construction, operation, monitoring, and closure/post-closure. This requirement is applicable for RCRA hazardous wastes on OU No. 3 if the remedial action includes onsite treatment, storage, or disposal of waste in a miscellaneous unit, and relevant and appropriate if sufficiently similar to hazardous waste.
40 C.F.R. § 761.60 (PCB Disposal)	Yes	Serves as ARAR for disposal of affected materials containing concentrations of PCBs, if affected materials are identified at OU No. 3. This requirement is applicable.

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<p align="center">Table A-4 Soils or Solid Media ARARs RSR Corporation Superfund Site OU No. 3</p>			Page 4 of 11
Requirement	ARAR?	Justification	
2. Action-Specific ARARs (Continued)			
Federal (Continued)			
40 C.F.R. § 761.65(c)(7) (PCB Storage)	No	Serves as an ARAR only to extent that it authorizes storage of liquid PCBs in containers meeting 29 C.F.R. § 1910.106 (OSHA Standards for Flammable and Combustible Liquids); requires preparation and implementation of Spill Prevention Control and Countermeasures plan. Not an ARAR since liquid PCBs were not identified at OU No. 3.	
OSHA Worker Protection 29 C.F.R. 1910.120	Yes	Applicable to OU No. 3 regarding protection of workers at site. (29 C.F.R. 1910.120)	
Surface Mining Control and Reclamation Act of 1977 25 GSC §§ 1201 <i>et. seq.</i> ; 30 C.F.R. Parts 816.11, .95, .97, .100, and .102	Yes	<p>The requirements include provisions for:</p> <ul style="list-style-type: none"> .11 – Posting signs and markers for reclamation, including top soil markers and perimeter markers. .95 – Stabilization of all exposed surface areas to effectively control erosion and air pollution attendant to erosion. .97 – Use of best technology currently available to minimize disturbances and adverse impacts on fish, wildlife, and related environmental values and achieve enhancement of such if possible. .100 – Contemporaneous reclamation including, but not limited to backfilling, regrading, topsoil replacements and revegetation. .102 – Achieve a post action slope not exceeding angle of repose or such lesser slope as is necessary to achieve a minimum long-term static safety factor of 1.3 and to prevent slides. <p>These requirements are relevant and appropriate to OU No. 3.</p>	
State			
General Prohibitions 30 TAC § 330.5	Yes	The regulation prohibits disposal of lead acid storage batteries at municipal solid waste landfills. This requirement is relevant and appropriate for battery casings identified on OU No. 3.	

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Table A-4
Soils or Solid Media ARARs
RSR Corporation Superfund Site OU No. 3

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Requirement	ARAR?	Justification
2. Action-Specific ARARs (Continued)		
State (Continued)		
Closure and Remediation Subchapter A 30 TAC § 335.8	Yes	These provisions apply to closure and remediation of facilities associated with contamination resulting from unauthorized discharges, either as part of closure or at any time before or after closure. The regulations also apply to remediation of areas that are not otherwise designated as a facility but that contain unauthorized discharges of industrial waste or municipal hazardous waste. Section (a)(2) of this citation specifies that, for remediations performed under the State Superfund program, media cleanup levels should be based on future residential land use unless it is demonstrated that an alternative land use is more appropriate. These requirements are relevant and appropriate for RCRA hazardous wastes on OU No. 3.
Post Closure Care and Deed Certification for Risk Reduction Standard Number 2 Subchapter S 30 TAC § 335.560	Yes	These provisions specify that, upon attainment of Risk Reduction Standard Number 2, a deed recordation be placed in the county using information contained in Subsections (1) through (4). This requirement is relevant and appropriate to OU No. 3 in so much that provisions similar to Risk Reduction Standard Number 2 are applied.
Attainment of Risk Reduction Standard Number 3: Closure/Remediation with Controls Subchapter S 30 TAC § 335.561	Yes	Under Risk Reduction standard Number 3, a remedy must be permanent, or if that is not practicable, achieve the highest degree of long-term effectiveness possible; cost-effective; and achieve media cleanup requirement specified in 30 TAC § 335.563. These provisions are relevant and appropriate to OU No. 3.
Remedy Evaluation Factory for Risk Reduction Standard Number 3 Subchapter S 30 TAC § 335.562	Yes	These provisions outline the evaluation criteria when evaluating the relative abilities and effectiveness of potential remedies to achieve the requirements for remedies described in 30 TAC § 335.562. The evaluation criteria are relevant and appropriate for screening technologies and alternatives is part of the FS for OU No. 3.
Media Cleanup Requirements for Risk Reduction Standard Number 3 Subchapter S 30 TAC § 335.563	Yes	This section specifies the requirements for establishing cleanup levels for air, surface water, groundwater, and soil, including use of media-specific adjustments. The requirements of this section are relevant and appropriate to OU No. 3.
Post closure care not required for Risk Reduction Standard Number 3 Subchapter S 30 TAC § 335.564	Yes	Where it is determined that neither engineering nor institutional control measures are required, no post closure care responsibilities are necessary however deed recordation is required in accordance with 30 TAC § 335.566. This requirement is relevant and appropriate if the conditions are met at OU No. 3.
Shipping and Reporting Procedures Applicable to Generators of Hazardous Waste or Class I Waste and Primary Exporters of Hazardous Waste Subchapter A 30 TAC § 335.10	Yes	Establishes requirements for manifesting shipments of hazardous waste to off-site facilities. This requirement is applicable to OU No. 3 if hazardous or Class I wastes are shipped off-site to a disposal/treatment facility.

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Table A-4
Soils or Solid Media ARARs
RSR Corporation Superfund Site OU No. 3

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Requirement	ARAR?	Justification
2. Action-Specific ARARs (Continued)		
State (Continued)		
Shipping Requirements for Transporters of Hazardous Waste or Class I Waste Subchapter A 30 TAC § 335.11	Yes	Requirements specific to transporters of hazardous or class I wastes regarding manifesting waste shipments. These requirements are applicable to any transporter who transports hazardous or class I wastes offsite from OU No. 3.
Shipping Requirements Applicable to Owners or Operators of Storage, Processing, or Disposal Facilities Subchapter A 30 TAC § 335.12	No	Requires owners or operators of storage, processing or disposal facilities to comply with manifest requirements upon receipt of waste shipment. This requirement is not an ARAR for OU No. 3 because waste shipments will not be received at the RSR Site.
Special Definitions for Recyclable Materials and Nonhazardous Recyclable Materials Subchapter A 30 TAC § 335.17	Yes	Specifies definition of recyclable materials including "scrap metal." This requirement is applicable to OU No. 3 if materials (building components, etc.) are to be recycled.
Requirements for Recyclable Materials and Nonhazardous Recyclable Materials Subchapter A 30 TAC § 335.24 (c) and (h)	Yes	Specifies that scrap metal is not subject to regulation under Subchapter B-I and O of Chapter 335. Under § 335.24(h), the rule specifies that scrap metal, as defined in Section (c) remains subject to the requirements of § 335.4 (relating to General Prohibitions) and § 335.6 (relating to Notification Requirements). Such waste may also be subject to the requirements of § 335.10 through § 335.15 of Title 30. These requirements are applicable to OU No. 3 if scrap metal materials are recycled.
Adoption of Appendices by Reference Subchapter A 30 TAC § 335.29	Yes	Adopts appendices contained in 40 C.F.R. Part 261 by reference; this includes Appendix I-III, VII-X. I - Representative Sampling Methods II - Method 1311 Toxicity Characteristic Leaching Procedure III - Chemical Analysis Test Methods VII - Basis for Listing Hazardous Waste VIII - Hazardous Constituents IX - Wastes Excluded under § 260.20 and § 260.22 X - Method of Analysis for Chlorinated Dibenzo-p-dioxins and Dibenzofurans. These requirements are applicable for OU No. 3 to determine which, if any, media are RCRA hazardous wastes. These requirements are not applicable since much of the contaminated media was disposed of prior to 1980.

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Table A-4
Soils or Solid Media ARARs
RSR Corporation Superfund Site OU No. 3

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Requirement	ARAR?	Justification
2. Action-Specific ARARs (Continued)		
State (Continued)		
Hazardous Waste Management General Provisions Subchapter B 30 TAC § 335.41	Yes	This subchapter implements a state hazardous waste program which controls from point of generation to ultimate disposal those wastes listed in 40 C.F.R. Part 261. These standards are relevant and appropriate for RCRA hazardous wastes on OU No. 3.
Standards Applicable to Generators of Hazardous Wastes Subchapter C 30 TAC § 335.61, §§ 335.65-335.70	Yes	This subchapter establishes standards for generators of hazardous waste. These standards include: packaging, labeling, marking, placarding, accumulation time, and record-keeping. Requirements for packaging, labeling, marking, and placarding are relevant and appropriate for RCRA hazardous wastes on OU No. 3.
Standards Applicable to Transporters of Hazardous Waste Subchapter D 30 TAC § 335.91	Yes	This subchapter establishes standards for transporters transporting hazardous waste to offsite storage, processing, or disposal facilities. This subchapter does not apply to onsite transportation of hazardous waste by generators or by owners or operators of storage, processing, or disposal facilities. Requirements of this subchapter are applicable for RCRA hazardous wastes on OU No. 3 that are sent offsite for disposal.
Applicability of Groundwater Monitoring and Response Subchapter F 30 TAC § 335.156	Yes	This section outlines the rules pertaining to groundwater monitoring and response, which apply to owners and operators of facilities that process, store, or dispose of hazardous waste. The owner or operator must satisfy the requirements of § 335.156 (a)(2) for all wastes (or constituents thereof) contained in any such waste management unit at the facility, regardless of the time at which waste was placed in the units. These requirements are relevant and appropriate for RCRA hazardous wastes left in place or disposed on OU No. 3.
Required programs Subchapter F 30 TAC § 335.157	Yes	Requires owners and operators subject to 30 TAC § 335.156 to conduct a monitoring and response program as follows: (1) Whenever hazardous constituents from a regulated unit are detected at the compliance point, the owner or operator must institute a compliance monitoring program. (2) Whenever the groundwater protection standard is exceeded, the owner or operator must institute a corrective action program. (3) Whenever hazardous constituents from a regulated unit exceed concentration limits under § 335.160 in groundwater between the compliance point and the downgradient facility boundary, the owner or operator must institute a corrective action program, and (4) In all other cases, the owner or operator must institute a detection monitoring program. These requirements are relevant and appropriate for RCRA hazardous wastes left onsite at OU No. 3.

Table A-4
Soils or Solid Media ARARs
RSR Corporation Superfund Site OU No. 3

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Requirement	ARAR?	Justification
2. Action-Specific ARARs (Continued)		
State (Continued)		
Interim Standards for Owners and Operators of Hazardous Waste Storage, Processing, or Disposal Facilities Subchapter E 30 TAC § 335.111	Yes	This subchapter establishes minimum requirements that define the acceptable management of hazardous waste prior to the issuance or denial of a hazardous waste permit and until certification of final closure or, if the facility is subject to post-closure requirements, until post-closure responsibilities are fulfilled. These requirements are relevant and appropriate for RCRA hazardous wastes on OU No. 3 if wastes are left onsite.
Interim Standards for Owners and Operators of Hazardous Waste Storage, Processing, or Disposal Facilities-Standards Subchapter E 30 TAC § 335.112	Yes	Adopts 40 C.F.R. Part 265, except as noted, by reference. This includes Subparts B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, W, AA, and BB. These requirements are relevant and appropriate for RCRA hazardous wastes on OU No. 3 if wastes are left onsite.
Containment for Waste Piles Subchapter E 30 TAC § 335.120	Yes	Establishes requirements for hazardous leachate or run-off from a pile: 1) the pile must be placed on an impermeable base, must include a run-on control system and a run-off management system and 2) the pile must be managed such that it must be protected from precipitation and run-on and no liquids or wastes containing free liquids may be placed in the pile. These requirements are applicable for RCRA hazardous wastes on OU No. 3 if waste piles are created during remediation.
Permitting Standards for Owners and Operators of Hazardous Waste Storage Processing or Disposal Facilities Subchapter F 30 TAC § 335.151	Yes	Subchapter F includes the minimum standards of operation for all aspects of the management and control of municipal hazardous waste and industrial solid waste, including rules relating to the siting of hazardous waste facilities. Permit not required, however, substantive portions must be met. These standards are relevant and appropriate for RCRA hazardous wastes on OU No. 3.
Standards Subchapter F 30 TAC § 335.152	Yes	Adopts by reference the regulations contained in 40 C.F.R. Part 264, except as noted in this section. These standards are ARARs for RCRA hazardous wastes on OU No. 3.
Corrective Action for Solid Waste Management Units Subchapter F 30 TAC § 335.167(b) and (c)	No	Outlines requirements for corrective action at solid waste management units. No solid waste management units have been identified at OU No. 3. These standards are not ARARs because no regulated units have been established at OU No. 3.

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Table A-4
Soils or Solid Media ARARs
RSR Corporation Superfund Site OU No. 3

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Requirement	ARAR?	Justification
2. Action-Specific ARARs (Continued)		
State (Continued)		
Design and Operating Requirements (Waste Piles) Subchapter F 30 TAC § 335.170	Yes	Establishes requirements for waste piles including: 1) a liner designed, constructed, and installed to prevent any migration of wastes out of the pile and 2) a leachate collection and removal system immediately above the liner that is designed, constructed, maintained, and operated to collect and remove leachate from the pile. These requirements are applicable for RCRA hazardous wastes on OU No. 3 if waste piles are created during remediation.
Location Standards for Hazardous Waste Storage, Processing, or Disposal Subchapter G 30 TAC § 335.201 (a)(3)	Yes	This subchapter establishes minimum standards for the location of facilities used for the storage, processing, and disposal of hazardous waste. The requirements are applicable for any facility built onsite to store, process, or dispose of RCRA hazardous wastes.
Prohibition on Open Dumps Subchapter I 30 TAC § 335.302	Yes	Prohibits open dumping of industrial solid waste. Applicable to remedial actions at OU No. 3.
Hazardous Waste Generation, Facility, and Disposal Fees System Subchapter J 30 TAC § 335.321	No	Establishes an industrial solid waste and hazardous waste fee program which is an administrative requirement. Administrative requirements are not ARARs.
Hazardous Substance Facilities Assessment and Remediation Subchapter K 30 TAC § 335.341 (b)(4)	Yes	Outlines the scope and requirements associated with the State Superfund program, including: ranking of facilities (§ 335.343), delisting and modifications (§ 335.344), removal actions and preliminary site investigations (§ 335.346), general requirements for a remedial investigation/feasibility study (§ 335.348), and general requirements for a remedial action (§ 335.349). The requirements set forth in the rule are relevant and appropriate. However, because the RSR Site is proposed for listing on EPA's National Priorities List and is an EPA-lead Superfund site, the requirements are being met through the CERCLA RI/FS process.
Specific Air Emission Requirements for Hazardous or Solid Waste Management Facilities Subchapter L 30 TAC § 335.367	Yes	Requires hazardous or solid waste management facilities to use the best available control technology to control emission of air contaminants, considering technical practicability and economic factors. Requires the owner/operator to demonstrate that the facility or unit will not cause or contribute to air pollution. These requirements are relevant and appropriate to RCRA facilities constructed onsite at OU No. 3.
Pre-Application Review and Permit Procedures Subchapter M 30 TAC § 335.391-335.393	No	These requirements are administrative requirements. Administrative requirements are not ARARs.

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Table A-4
Soils or Solid Media ARARs
RSR Corporation Superfund Site OU No. 3

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Requirement	ARAR?	Justification
2. Action-Specific ARARs (Continued)		
State (Continued)		
Land Disposal Restrictions Subchapter O 30 TAC § 335.431	Yes	These provisions adopt 40 C.F.R. Part 268 by reference and are applicable for OU No. 3 if wastes are removed from the site for subsequent disposal. The Universal Treatment Standards adopted by Subchapter O establish a concentration limit for 300 regulated constituents in soil regardless of waste type.
Warning Signs for Contaminated Areas 30 TAC Subchapter P § 335.441	Yes	Provides standards and procedures for the placement of warning signs on property contaminated with hazardous substances when such contamination presents a danger to public health and safety. The requirements in Subchapter P are relevant and appropriate for RCRA hazardous wastes on OU No. 3.
Pollution Prevention Source Reduction and Waste Minimization Subchapter Q 30 TAC § 335.473	No	Applies to all large quantity generators, all generators other than large quantity and conditionally exempt generators, and all persons subject to reporting requirements under SARA 313 Title III. The RSR Site is not a large-quantity generator. Therefore, these requirements are not ARARs for OU No. 3.
Waste Classification and Waste Coding Required Subchapter R 30 TAC § 335.503	Yes	These requirements specify the classification scheme and coding for all industrial solid and municipal hazardous waste generated, stored, processed, transported, or disposed of in the site. These requirements are relevant and appropriate for all waste at OU No. 3.
Hazardous Waste Determination Subchapter R 30 TAC § 335.504	Yes	Requires waste generator to determine if the waste is hazardous either as a listed or characteristic waste according to 40 C.F.R. Part 261, Subpart D or 40 C.F.R. Part 261 Subpart C. These requirements are applicable for identifying RCRA hazardous waste at OU No. 3.
Class 1 Waste Determination Subchapter R 30 TAC § 335.505	Yes	Specifies the chemical/physical properties associated with a Class 1 non-hazardous industrial solid waste. This requirement is applicable for OU No. 3 relative to waste determination procedures.
Class 2 Waste Determination Subchapter R 30 TAC § 335.506	Yes	Requires determination of a Class 2 waste classification for industrial solid waste that is neither a hazardous waste, a Class 1 waste, nor a Class 3 waste. This requirement is applicable for OU No. 3.
Class 3 Waste Determination Subchapter R 30 TAC § 335.507	Yes	Specifies that industrial solid waste is a Class 3 waste if it is inert, essentially insoluble, neither a Class 1 nor hazardous waste, and poses no threat to human health and/or the environment. This requirement is applicable for OU No. 3.

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Table A-4
Soils or Solid Media ARARs
RSR Corporation Superfund Site OU No. 3

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Requirement	ARAR?	Justification
2. Action-Specific ARARs (Continued)		
State (Continued)		
Classification of Specific Industrial Solid Wastes Subchapter R 30 TAC § 335.508(l)	Yes	Section (2) establishes requirements for empty containers; section (3) provides the classification criteria for paper, cardboard, food wastes, and general plant trash; Section (4) specifies that medical wastes subject to the provisions of Chapter 330 shall be designated as Class 2 wastes; and Section (7) mandates that wastes generated by the mechanical shredding of automobiles, appliances, or other items of scrap, used or obsolete metals shall be handled according to the provisions set forth in Texas Solid Waste Disposal act, the Health and Safety Code (§ 361.019) until specific standards are developed for the classification of this waste and adequate disposal capacity is assured. Applicable to OU No. 3 due to open dumping that has occurred at OU No. 3 which includes empty containers, general trash, and medical wastes.
TNRCC Historically Contaminated Sites: Industrial Versus Municipal Solid Waste July 12, 1994	TBC	In an interoffice memorandum, TNRCC established requirements that, before the final deposition of a waste is carried out, the site owner or operator must accomplish at least the following: <ul style="list-style-type: none"> 1. Waste type determination (municipal or industrial) and 2. Hazardous waste determination in accordance with 30 TAC § 335.62 <p>Wastes from a presently inactive facility (generator) where previous industrial activities occurred or industrial waste was generated, would be classified as industrial waste.</p> <p>As nonpromulgated guidelines, these requirements are TBCs for OU No. 3.</p>
3. Location-Specific ARARs		
Federal		
Coastal Zone Management Act 16 U.S.C. § 1451 <u>et seq.</u> 40 C.F.R. § 6.302(d)	No	Requires assessment of the impacts of activities on a coastal zone and the conduct of activities in connection with a coastal zone in accordance with a state approved Coastal Zone Management Plan. Activities at OU No. 3 will not impact a coastal zone; therefore this requirement is not an ARAR.
40 C.F.R. § 264.18 (Location Standards)	No	Relates to hazardous waste treatment, storage, or disposal facilities subject to permitting. Requires that new units where treatment, storage, or disposal of hazardous waste will be conducted be located greater than 200 feet from a fault with displacement in Holocene time and that facilities located in 100-year floodplains be designed, constructed, and operated to prevent washout of hazardous waste from active portions of the facility. Since the site is not in a 100-year floodplain, this regulation is not an ARAR. The site is not within 200 feet of a fault, thus the provisions pertaining to faults are not ARARs.

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Table A-5
Soils or Solid Media Waste Contaminant-Specific ARARs
Maximum Leachable Concentrations
Subchapter R Waste Determination
RSR Corporation Superfund Site OU No. 3

Parameter	Concentration (mg/L)
Acetone	400
Acetonitrile	20
Acetophenone	400
Acrylamide	0.08
Acrylonitrile	0.6
Aniline	60
Antimony	1
Arsenic	1.8
Barium	100
Benzene	0.5
Benzidine	0.002
Beryllium	0.08
Bis(2-chloroethyl)ether	0.3
Bis(2-ethylhexyl)phthalate	30
Bromodichloromethane	0.3
Bromomethane	5
Butylbenzyl phthalate	700
Cadmium	0.5
Carbon disulfide	400
Carbon tetrachloride	0.5
Chlordane	0.03
Chlorobenzene	70
Chloroform	6
2-Chlorophenol	20
Chromium	5
m-Cresol	200
o-Cresol	200
p-Cresol	200
Cyanide	70
DDD	1
DDE	1
DDT	1
Dibutyl phthalate	400
1,4-Dichlorobenzene	7.5
3,3-Dichlorobenzidine	0.8
1,2-Dichloroethane	0.5
Dichlorodifluoromethane	700
1,1-Dichloroethylene	0.6
1,3-Dichloropropene	1
2,4-Dichlorophenol	10
2,4-D	10
Dieldrin	0.02

026496

Table A-5
Soils or Solid Media Waste Contaminant-Specific ARARs
Maximum Leachable Concentrations
Subchapter R Waste Determination
RSR Corporation Superfund Site OU No. 3

Parameter	Concentration (mg/L)
Diethyl phthalate	3,000
Dimethoate	70
m-Dinitrobenzene	0.4
2,4-Dinitrophenol	7
2,4-Dinitrotoluene	0.13
1,4-Dioxane	30
Diphenylamine	90
1,2-Diphenylhydrazine	0.4
Disulfoton	0.1
Endosulfan	0.2
Endrin	0.02
Epichlorohydrin	40
Ethylbenzene	400
Ethylene dibromide	0.004
Heptachlor	0.008
Heptachlor epoxide	0.04
Hexachlorobenzene	0.13
Hexachloro-1,3-butadiene	0.4
Hexachlorocyclopentadiene	20
Hexachloroethane	3
Hexachlorophene	1
Isobutyl alcohol	1,000
Isophorone	90
Lead	1.5
Lindane	0.3
Mercury	0.2
Methacrylonitrile	0.4
Methomyl	90
Methoxychlor	10
Methyl ethyl ketone	200
Methyl isobutyl ketone	200
Methylene chloride	50
Methyl parathion	0.9
Nickel	70
Nitrobenzene	2
N-Nitroso-di-n-butylamine	0.06
N-Nitrosodiphenylamine	70
N-Nitrosomethylethylamine	0.02
N-Nitroso-n-propylamine	0.05
Parathion	20
Pentachlorobenzene	3
Pentachlorophenol	100

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Table A-5 Soils or Solid Media Waste Contaminant-Specific ARARs Maximum Leachable Concentrations Subchapter R Waste Determination RSR Corporation Superfund Site OU No. 3	
Parameter	Concentration (mg/L)
Phenol	2,000
Pyridine	4
Selenium	1
Silver	5
Styrene	700
1,1,1,2-Tetrachloroethane	10
1,1,2,2-Tetrachloroethane	2
Tetrachloroethylene	0.7
Toluene	1,000
Toxaphene	0.3
trans-1,3-Dichloropropene	1
1,2,4-Trichlorobenzene	70
1,1,1-Trichloroethane	300
Trichloroethylene	0.5
1,1,2-Trichloroethane	6
Trichlorofluoromethane	1,000
2,4,5-TP	1
Vinyl chloride	0.2
Xylenes	7,000

Table A-6 Soil/Solid Media Contaminant-Specific ARARs RSR Corporation Superfund Site OU No.3								
Chemical	1 R&A Residential (mg/kg)	a,b,c	R&A Industrial (mg/kg)	a,c,d	2 TBC Residential (mg/kg)		2 TBC Industrial (mg/kg)	3 A (mg/L)
Inorganics								
Antimony	110.		818		110		818	
Arsenic	0.366		3.27		0.366		3.27	5
Barium	19,100		137,000		19,195		142,476	100
Beryllium	0.149		1.33					
Cadmium	137		1,020		274		2,044	1
Chromium	391		5,110		938		1,577	5
Cobalt								
Copper					10,154		75,628	
Lead	500	e	1,000	e	540	k	2000	5
Manganese					37,669		258,711	
Mercury	82.3		613		82.3		613	0.2
Nickel	1,560	f	20,400	f	5,488		40,880	
Selenium	1,370		10,220		1,372		10,220	1
Silver	1,370		10,220		1,372		10,220	5
Thallium					21.9		164	
Vanadium					1,921		14,308	
Zinc					82,330		613,200	
Organics								
1,1,1-Trichloroethane	9,360		14,000		24,699		183,954	
2-Butanone	7,580		14,400		164,656		1,226,178	
2-Methylnaphthalene								
4,4'-DDD	2.67		23.8		2.67		23.8	
4,4'-DDE	1.88		16.8		1.88		16.8	
4,4'-DDT	1.88		16.8		1.88		16.8	
2-Methyl-2-pentanone								
Acenaphthene	13,400	g	44,300	g	16,466		122,640	
Acenaphthylene								
Acetone	3,820	g	4,160	g	27,433		204,400	
Anthracene	59,100	g	151,000	g	82,330		613,200	
Arochlor-1242	10	h	25	h	0.083		0.74	
Arochlor-1248	10	h	25	h	0.083		0.74	
Arochlor-1254	10	h	25	h	0.083		0.74	
Arochlor-1260	10	h	25	h	0.083		0.74	
delta-BHC								
gamma-BHC	82.3		613					0.4

Table A-6
Soil/Solid Media Contaminant-Specific ARARs
RSR Corporation Superfund Site OU No.3

Chemical	1 R&A Residential (mg/kg)	a,b,c	1 R&A Industrial (mg/kg)	a,c,d	2 TBC Residential (mg/kg)	2 TBC Industrial (mg/kg)	3 A (mg/L)
Benzene	1.33	g	1.62	g	22	197	0.5
Benzo(a)anthracene					0.87	7.84	
Benzo(a)pyrene					0.087	0.784	
Benzo(b)fluoranthene					0.87	7.84	
Benzo(g,h,i)perylene							
Benzo(k)fluoranthene					8.77	78.4	
bis(2-Ethylhexyl)phthalate	45.7		409		45.7	409	
Carbazole					32	286	
alpha-Chlordane	0.493	i	4.4	i			0.03
gamma-Chlordane	0.493	i	4.4	i			
Chrysene					87.7	784	
Di-n-butyl phthalate	27,400		204,000		27,433	204,400	
Di-n-octyl phthalate	5,490		40,900		5,488	40,880	
Dibenz(a,h) anthracene					0.087	0.784	
Dibenzofuran					1,097	8,176	
Dieldrin	0.04		0.357		0.04	0.357	
Diethylphthalate	220,000		NHIB		219,548	1,635,200	
Endosulfan I	13.7	j	102	j	1,646	12,264	
Endosulfan II	13.7	j	102	j			
Endosulfan sulfate							
Endrin	82.3		613		82.3	613	0.02
Endrin aldehyde							
Endrin ketone							
Ethylbenzene	11,400	g	17,000	g	27,443	204,393	
Fluoranthene	11,000		81,800		10,977	81,760	
Fluorene	9,600	g	38,700	g	10,977	81,760	
Heptachlor epoxide	0.0704		0.629		0.0704	0.629	
Indeno(1,2,3-cd)pyrene					0.87	7.84	
Methylene chloride	10.7	g	13.8	g	85.3	763	
N-Nitrosodiphenylamine							
Naphthalene	491		772				
Phenanthrene							
Phenol	165,000		NHIB		164,661	1,226,400	
Pyrene	8,200		61,400		8,233	61,320	
Toluene	3,580	g	3,630	g	54,885	408,738	
Trichloroethene	2.4	g	2.85	g	58.2	520	

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Table A-6 Soil/Solid Media Contaminant-Specific ARARs RSR Corporation Superfund Site OU No.3								
Chemical	1 R&A Residential (mg/kg)	a,b,c	1 R&A Industrial (mg/kg)	a,c,d	2 TBC Residential (mg/kg)		2 TBC Industrial (mg/kg)	3 A (mg/L)
Xylene (total)	5,470	g	5,800	g	548,872		4,088,000	
Notes: Medium-Specific Concentrations, Standards, and Criteria for Health-Based Closure/Remediation. 30TAC Section 335.568, Appendix II. Preliminary Remediation Goals. Calculated Based on Human Health Evaluation Manual, Part B; Development of Risk-Based Preliminary Remediation Goals. OSWER Directive 9285.7-01B. Toxicity Characteristic Leaching Procedure (TCLP) criteria. 40 CFR Part 261. Note, units are mg/L. a = Residential soil concentrations (maximum) are calculated according to 30 TAC Section 335.567. b = All concentrations calculated using data from IRIS and HEAST. c = In some cases, an oral RfD or an oral slope factor was substituted for the inhalation RfD or inhalation slope factor. d = Industrial soil concentrations (maximum) are calculated according to 30 TAC Section 335.567. e = Based on values calculated using EPA's Lead Uptake/Biokinetic Model, Version 0.4. f = The MSCs calculated for this compound are based on noncarcinogenic effects. g = The sum of concentrations of the volatile compounds in vapor phase in soil shall not exceed 1,000 ppm by weight or volume. h = Soil MSCs for polychlorinated biphenyls are based on the April 2, 1987 TSCA Regulations; 52 FR 10688. i = Value presented is for chlordane. j = Value presented is for endosulfan. k = Based on values calculated using EPA's Lead Uptake/Biokinetic Model, Version 0.99. l = Based on Bowers methodology. A = Applicable. R&A = Relevant and appropriate. TBC = To be considered.								

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Table A-7
Surface Water ARARs
RSR Corporation Superfund Site OU No. 3

Page 1 of 10

Requirement	ARAR?	Justification
1. Contaminant-Specific ARARS		
Federal		
Safe Drinking Water Act 40 U.S.C. 399 Primary Drinking Water Standards (MCL) 40 C.F.R. Part 141	No	There is no direct contact between the source of contaminants and surface water at the site. Surface waters around site are not designated for public or private water supply. MCLs are not ARARs for surface water at OU No. 3.
Secondary Drinking Water Standards 40 C.F.R. Part 143	No	Secondary standards are aesthetic rather than health based and therefore are not ARARs as surface water is unlikely to be utilized as a source of drinking water.
Maximum Contaminant Level Goals (MCLG) 40 C.F.R. § 141.50	No	Not presently considered an ARAR as surface waters are not utilized as a source of drinking water.
Federal Clean Water Act Water Quality Criteria 40 C.F.R. Part 131 U.S. EPA Quality Criteria for Water, 1976, 1980, and 1986	No	These criteria (ambient water quality criteria) apply to water classified as a fisheries resource. Water bodies on OU No. 3 are not classified as such. Therefore, not an ARAR or TBC for OU No. 3.
Toxic Pollutant Effluent Standards 40 C.F.R. Part 129	No	Standards are applicable to point source discharges to navigable waters from specified facilities that discharge aldrin/dieldrin, DDT, endrin, toxaphene, benzidine, PCB's. No point source discharges to navigable waters are associated with OU No. 3.
Hazardous Substances 40 C.F.R. § 116.3 and 116.4	No	Establishes reporting requirements for certain discharges of reportable quantities of hazardous substances. Creates no substantive clean up requirement. Not an ARAR.

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Table A-7
Surface Water ARARs
RSR Corporation Superfund Site OU No. 3

Page 2 of 10

Requirement	ARAR?	Justification
1. Contaminant-Specific ARARS (Continued)		
State		
Pollution Prohibition Texas Water Code § 26.121	Yes	Prohibits the discharge of wastes into or adjacent to any natural or artificial bodies of surface water, inland or coastal, which in itself or in conjunction with any other discharge or activity, causes or will cause pollution of the surface water. May be relevant and appropriate for OU No. 3 due to discharges to onsite drainages.
Texas Surface Water Quality Standards Aesthetics 30 TAC § 307.4(b)(1)	Yes	General prohibition of concentrations in surface water of taste and odor producing substances which impart unpalatable flavor to food fish including shellfish, or otherwise interfere with the reasonable use of the water in the state. Relevant and appropriate for OU No. 3 due to discharges to onsite drainages.
General Toxicity 30 TAC § 307.4(d)	Yes	Surface waters must not be toxic to man or to terrestrial or aquatic life. Relevant and appropriate for OU No. 3 due to discharges to onsite drainages.
Antidegradation 30 TAC § 307.5	Yes	Requires maintenance and protection of existing uses (baseline November 28, 1975) when discharging wastewater. Relevant and appropriate for OU No. 3 due to discharges to onsite drainages.
Acute Toxicity 30 TAC § 307.6(b)(1)	No	Surface water must not be acutely toxic to aquatic life (except in small zones of initial dilution at discharge points). This criteria applies to water classified as a fisheries resource. The intermittent drainages and ponds on OU No. 3 are not classified as such; therefore, not an ARAR for OU No. 3.
Chronic Toxicity 30 TAC § 307.6(b)(2)	No	Surface water with designated for existing aquatic life uses shall not be chronically toxic to aquatic life (except in mixing zones and below critical low-flow conditions). No surface water bodies impacted by OU No. 3 have a designated or aquatic life use; therefore the requirement is not an ARAR.
Human Toxicity 30 TAC § 307.6(b)(3)	No	Surface water must be maintained to preclude adverse toxic effects on human health resulting from contact recreation, consumption of aquatic organisms, or consumption of drinking water after reasonable treatment. This regulation is not an ARAR to the extent that it pertains to drinking water, as surface water in the area is not a potential source of drinking water.

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Table A-7

Surface Water ARARs

RSR Corp. Superfund Site OU No. 3

Page 3 of 10

Requirement	ARAR?	Justification
1. Contaminant-Specific ARARs (Continued)		
State (Continued)		
Numerical Criteria for Toxics 30 TAC § 307.6(c)	Yes	<p>Numerical criteria are established for certain toxic materials. These criteria are relevant and appropriate for OU No. 3.</p> <p>Notes: (1) These numerical criteria are based on ambient water quality criteria documents published by EPA. For some chemicals, EPA criteria have been recalculated (in accordance with procedures in the EPA guidance document entitled "Guideline for Deriving Site-Specific Water Quality Criteria") to eliminate the effects of toxicity data for aquatic organisms which are not known to occur in Texas. 31 TAC § 307.6(c)(2).</p> <p>(2) Numerical Acute Criteria apply to all surface water (except in small zones of initial dilution at discharge points). Numerical chronic criteria apply to surface water with designated or existing aquatic life uses (except inside mixing zones and below critical low-flow conditions).</p> <p>(3) Numerical Acute Criteria are applied as 24-hour averages. Numerical Chronic criteria are applied as seven-day averages.</p>
LC50 Toxicity Criteria 30 TAC § 307.6(c)(8)	Yes	<p>Concentrations of toxic materials for which no numerical criteria have been specified must not exceed values which are chronically toxic to representative, sensitive aquatic organisms, as determined from appropriate chronic toxicity data or calculated as 0.1 of the median lethal concentration (LC50) for nonpersistent toxics (i.e., readily degrades, half-life less than 96 hours), 0.05 of LC50 for nonbioaccumulative, persistent toxics, and 0.01 of the completion of remediation. Relevant and appropriate for OU No. 3 due to discharges to onsite drainages.</p>

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Table A-7
Surface Water ARARs
RSR Corporation Superfund Site OU No. 3

Page 4 of 10

Requirement	ARAR?	Justification
1. Contaminant-Specific ARARS (Continued)		
State (Continued)		
Site-Specific Uses and Criteria 30 TAC § 307.7(b)(5)	Yes	Basic uses such as navigation, agricultural water supply, and industrial water must be maintained and protected for all surface water in which these uses can be achieved. Relevant and appropriate for OU No. 3 due to discharges to onsite drainages.
Oyster Waters 30 TAC § 307.7(b)(3)(B)(iii)	No	Oyster waters should be maintained so that concentrations of toxic materials do not cause edible species of clams, oysters, and mussels to exceed accepted guidelines for the protection of public health, including the U.S. Food and Drug Administration action levels for molluscan shellfish. These criteria are not ARARs since no discharges to oyster water occur.
Standards of Chemical Quality 30 TAC § 290.103(1),(3)	No	Specifies the maximum contaminant levels for inorganic and organic compounds that apply to community and non-transient, non-community water systems. These values are not ARARs for OU No. 3.
Secondary Constituent Levels 30 TAC § 290.113	No	These secondary constituent level limits, based on aesthetic and organoleptic considerations, are applicable to all public water systems. These levels are TBC for OU No. 3.
Attainment of Risk Reduction Standard Number 1: Closure/Remediation to Background Subchapter S 30 TAC § 335.554	No	These provisions specify that, to meet Risk Reduction Standard No. 1, closure and/or remediation must meet background levels or practical quantitation limits if the practical quantitation limit exceeds background. The provisions would be relevant and appropriate if Risk Reduction Standard No. 1 were the preferred standard; however, it is unlikely that cleanup goals will be set at background levels.
Attainment of Risk Reduction Standard Number 2: Closure/Remediation to Health-Based Standards and Criteria Subchapter S 30 TAC § 335.555	Yes	Subsection (d) specifies that the concentration of a contaminant in contaminated media of concern such as groundwater, surface water, air, or soil shall not exceed the cleanup levels as defined in § 335.556 (relating to Determination of Cleanup Levels for Risk Reduction Standard No. 3). If the practical quantitation limit and/or background concentration is greater than the cleanup level, the greater of the practical quantitation limit or background shall be used for determining compliance with the requirements of this section. These provisions are relevant and appropriate to development of contaminant-specific cleanup goals for OU No. 3.

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Table A-7
Surface Water ARARs
RSR Corporation Superfund Site OU No. 3

Page 5 of 10

Requirement	ARAR?	Justification
1. Contaminant-Specific ARARS (Continued)		
State (Continued)		
Determination of Cleanup Levels for Risk Reduction Standard Number 2 Subchapter S 30 TAC § 335.556	Yes	Specifies that for purposes of risk reduction, cleanup levels for individual contaminants are represented by Texas or federal promulgated health-based standards, or when these are not available or do not provide appropriate protection, then cleanup levels based on procedures specified for determining other numerical criteria (medium-specific concentration or MSC) are required to be developed. These provisions are relevant and appropriate to OU No. 3.
Medium-Specific Concentrations for Risk Reduction Standard Number 2 Subchapter S 30 TAC § 335.558	Yes	Subsections (b) through (d) of this section specify the methods for calculating medium-specific concentrations for ingestion of surface water and groundwater, and for ingestion along with inhalation of volatiles and particulates. These provisions are relevant and appropriate to setting contaminant-specific cleanup goals for OU No. 3, and are to be applied after evaluation of 30 TAC § 307 and primary drinking water MCLs.
Medium-Specific Requirements and Adjustments for Risk Reduction Standard Number 2 Subchapter S 30 TAC § 335.559	Yes	Subsections (b) through (d) specify requirements that can define or modify numeric cleanup levels such as media-specific concentrations or require non-health based criteria to be addressed. These provisions are relevant and appropriate to establishing cleanup goals for OU No. 3.
Surface Water Media-Specific Concentration, Risk Reduction Standard Number 2 30 TAC § 335.558	Yes	To be applied after evaluation of 30 TAC § 307 and primary drinking water MCLs. Relevant and appropriate for OU No. 3 due to discharges to onsite drainages.

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Table A-7
Surface Water ARARs
RSR Corporation Superfund Site OU No. 3

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Requirement	ARAR?	Justification
2. Action-Specific ARARs		
Federal		
Federal Clean Water Act National Pollutant Discharge Elimination System, Section 402	No	A permit is not required for onsite CERCLA response actions. Provision establishes no substantive cleanup requirement.
Stormwater Regulations 40 C.F.R. Parts 122, 125	Yes	NPDES permits are addressed relative to stormwater discharges associated with industrial activity. These regulations require the development and implementation of a stormwater pollution prevention plan or a stormwater best management plan. Monitoring and reporting requirements for a variety of facilities are outlined. Runoff from construction activities is an ARAR depending on the nature of the remedial action selected. Relevant and appropriate if stormwater discharge occurs as a result of the remedial action.
Pretreatment Standards 40 C.F.R. § 403.5	Yes	Prohibits discharge to a POTW of pollutants that "pass-through" (exit the POTW in quantities or concentrations that violate the POTW's NPDES permit) or cause "interference" (inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal, thereby causing a violation of the POTW's NPDES permit). Also prohibits introduction into a POTW of: (1) pollutants which create a fire or explosion hazard, (2) pollutants which will cause corrosive structural damage, (3) solid or viscous pollutants that will obstruct flow, (4) pollutants discharged at a flow rate and/or concentration that will cause interference, and (5) heat that will inhibit biological activity (never over 104°C). No point source discharges have been documented. However, if a remedial action results in a point source discharge to a POTW, then the requirements will be applicable to OU No. 3.

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Table A-7
Surface Water ARARs
RSR Corporation Superfund Site OU No. 3

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Requirement	ARAR?	Justification
2. Action-Specific ARARs (Continued)		
State		
Consolidated Permits Standard Permit Conditions 30 TAC § 305.125	No	Specifies conditions applicable to all permits. A permit is not required for onsite CERCLA response actions. The provisions establish no substantive cleanup requirements.
Consolidated Permits Subchapter O, Additional Conditions and Procedures for Wastewater Discharge Permits and Sewage Sludge Permits	No	Adopts by reference 40 CFR Part 122, Subpart C, Permit Conditions and Part 124, Subpart D, Specific Procedures Applicable to NPDES Permits. A permit is not required for onsite CERCLA response actions. The provisions establish no substantive cleanup requirement.
Texas Water Quality Act, TCA, Water Code, Title 2—State Water Commission	Yes	Places reporting requirements on remedial activities which may cause an accidental spill and discharge into the state waters. Whenever an accidental discharge or spill occurs at or from any activity or facility which causes or may cause pollution, the individual operating, in charge of, or responsible for the activity or facility shall notify the TNRCC as soon as possible and not later than 24 hours after the occurrence. Activities which are inherently or potentially capable of causing or resulting in the spillage or accidental discharge of waste or other substances and which pose serious or significant threats of pollution are subject to reasonable rules establishing safety and preventative measures which the commission may adopt or issue. The safety and preventative measures which may be required shall be commensurate with the potential harm which could result from the escape of the waste or other substances. Applicable to OU No. 3. during remediation.

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Table A-7
Surface Water ARARs
RSR Corporation Superfund Site OU No. 3

Requirement	ARAR?	Justification
2. Action-Specific ARARs (Continued)		
State		
General Provisions 30 TAC § 335.4	Yes	<p>Regulates the collection, handling, storage, disposal, and processing of hazardous or deleterious materials in the vicinity of, or adjacent to, state waters. Remedial actions must be designed with adequate measures and controls to ensure that no person may cause, suffer, allow, or permit the collection, handling, storage, processing, or disposal of industrial solid waste or municipal hazardous waste in such a manner to cause:</p> <ul style="list-style-type: none"> • The discharge or imminent threat of discharge of industrial solid waste or municipal hazardous waste into or adjacent to the waters in the state without obtaining specific authorization for such a discharge from the TNRCC. • The creation and maintenance of a nuisance; or • The endangerment of the public health and welfare. <p>Relevant and appropriate to actions taken at OU No. 3.</p>
Post-Closure Care and Deed Certification for Risk Reduction Standard Number 2 Subchapter S 30 TAC § 335.560	Yes	These provisions specify that, upon attainment of Risk Reduction Standard Number 2, a deed recordation be placed in the County using information contained in subsections (1) through (4). This requirement is relevant and appropriate to OU No. 3 inasmuch that provisions similar to Risk Reduction Standard Number 2 are applied.
Attainment of Risk Reduction Standard Number 3: Closure/Remediation with Controls Subchapter S 30 TAC § 335.561	Yes	Under Risk Reduction Standard Number 3, a remedy must be permanent, or if that is not practicable, achieve the highest degree of long-term effectiveness possible; cost-effective; and achieve media cleanup requirements specified in 30 TAC § 335.563. These provisions are relevant and appropriate to OU No. 3.
Remedy Evaluation Factors for Risk Reduction Standard Number 3 Subchapter S 30 TAC § 335.562	Yes	These provisions outline the evaluation criteria when evaluating the relative abilities and effectiveness of potential remedies to achieve the requirements for remedies described in 30 TAC § 335.564. The evaluation criteria are relevant and appropriate for screening technologies and alternatives as part of the FS for OU No. 3.

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Table A-7
Surface Water ARARs
RSR Corporation Superfund Site OU No. 3

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Requirement	ARAR?	Justification
2. Action-Specific ARARs (Continued)		
State		
Media Cleanup Requirements for Risk Reduction Standard Number 3 Subchapter S 30 TAC § 335.563	Yes	This section specifies the requirements for establishing cleanup levels for air, surface water, groundwater, and soil, including use of media-specific adjustments. The requirements of this section are relevant and appropriate to OU No. 3.
Post-Closure Care Not Required for Risk Reduction Standard Number 3 Subchapter S 30 TAC § 335.564	Yes	Where it is determined that neither engineering nor institutional control measures are required, no post-closure care responsibilities are necessary; however, deed recordation is required in accordance with 30 TAC § 335.566. This requirement is relevant and appropriate if the conditions are met at OU No. 3.
3. Location-Specific ARARS		
Federal		
Fish and Wildlife Coordination Act 16 U.S.C. § 661 <u>et seq.</u> 16 U.S.C. § 742 a 16 U.S.C. § 2901	Yes	Requires consultation when a modification of a stream or other water body is proposed or authorized and requires adequate provision for protection of fish and wildlife resources. Relevant and appropriate for OU No. 3 due to onsite drainages.
Marine Protection, Research and Sanctuaries Act 33 U.S.C. § 1401 (Title I) 40 C.F.R. Part 220 16 U.S.C. § 1431 <u>et seq.</u> (Title III) 15 C.F.R. Parts 922-941	No	Title I requires permit for dumping of wastes in U.S. ocean waters which have been transported from U.S. or from outside U.S. Activities at site will not include dumping of wastes into the ocean; therefore, title I is not an ARAR. Title III requires conservation and management of areas designated as National Marine Sanctuaries. Since there is no National Marine Sanctuary in or near the site, Title III is not an ARAR.
Clean Water Act § 404 33 U.S.C. § 1344 40 C.F.R. Parts 230, 231	No	Requires permit for the discharge of dredge or fill material into waters of the United States including wetlands (<u>see</u> 33 C.F.R. § 328.3). Not an ARAR since no discharge of dredge or fill material into waters of the U.S. is anticipated.

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Table A-7 Surface Water ARARs RSR Corporation Superfund			No. 3	Page 10 of 10
Requirement	ARAR?	Justification		
3. Location-Specific ARARS (Continued)				
Federal (Continued)				
Rivers and Harbors Act of 1899 33 U.S.C. § 403 33 C.F.R. Parts 320-322	No	Prohibits the creation of any unauthorized obstruction or work in navigable waters that affects such navigable waters without a permit. Even if navigable waters were present at the site, a nationwide permit is available for CERCLA site activities [see 33 C.F.R. § 330.5(a)(20)]. Since there are no navigable waters at the RSR Site, this requirement is not an ARAR.		
Protection of Wetlands Executive Order No. 11990 40 C.F.R. § 6.302(a) and Appendix A	Yes	Requires federal agencies to avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practical alternative exists.		
Floodplain Management Executive Order No. 11988 40 C.F.R. § 6.302(b)	Yes	Requires federal agencies to evaluate the potential effects of actions taken in a floodplain and to avoid or minimize impacts associated with direct and indirect development of a floodplain. Since portions of the site are within a 100-year floodplain, this Order is applicable, depending on location.		
Wild and Scenic Rivers Act 16 U.S.C. § 1271 <u>et seq.</u> 40 C.F.R. § 6.302(e)	No	Prohibits adverse effects on a scenic river. Since the site does not affect a scenic river, this Act is not an ARAR.		
Coastal Zone Management Act 16 U.S.C. § 1451 <u>et seq.</u> 40 C.F.R. § 6.302(d)	No	Requires assessment of the impacts of activities on a coastal zone and the conducting of activities in connection with a coastal zone in accordance with a state approved Coastal Zone Management Plan. The Act is not applicable or relevant and appropriate as OU No. 3 has no impact on coastal areas.		

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Table A-8										
Surface Water Contaminant-Specific ARARs										
RSR Corporation Superfund Site OU No. 3										
Chemical	1 R&A (mg/L)		2 R&A (mg/L)		3 R&A (mg/L)		4 R&A (mg/L)		9 R&A (mg/L)	10 R&A (mg/L)
Inorganics										
Antimony									0.006	
Arsenic	0.05	a			0.36		0.19		0.05	
Barium	1.	a							2	
Beryllium									0.004	
Cadmium	0.01	a			32.2*	a	1.1**		0.005	
Chromium	0.05	a			1,679.4*	a	200.2**		0.1	
Cobalt										
Copper					18.5*	a	12.4**			
Lead	0.005	a	0.025		77.5*	a	3.0**			
Manganese										0.05
Mercury	0.0000122	b	0.0000122		0.0024	a	0.0013		0.002	
Nickel					1,370.1*	a	152.3**		0.1	
Selenium	0.01	a			0.02		0.005		0.05	
Silver	0.05	a			0.00092	a	0.00049			
Thallium									0.002	
Vanadium										
Zinc					113.0*	a	102.4**			5
Organics										
1,1,1-Trichloroethane	0.2								0.2	
2-Butanone										
2-Methylnaphthalene										
4,4'-DDD	0.000297		0.000299							
4,4'-DDE	0.0000544		0.0000545							
4,4'-DDT	0.0000527		0.0000528		0.0011		0.000001			
2-Methyl-4-pentanone										
Acenaphthene										
Acenaphthylene										
Acetone										
Anthracene										
Arochlor-1242	0.0000013		0.0000013		0.002		0.000014		0.0005	
Arochlor-1248	0.0000013		0.0000013		0.002		0.000014		0.0005	
Arochlor-1254	0.0000013		0.0000013		0.002		0.000014		0.0005	
Arochlor-1260	0.0000013		0.0000013		0.002		0.000014		0.0005	
Delta-BHC										

Table A-8
Surface Water Contaminant-Specific ARARs
RSR Corporation Superfund Site OU No. 3

Chemical	1 R&A (mg/L)		2 R&A (mg/L)		3 R&A (mg/L)		4 R&A (mg/L)		9 R&A (mg/L)		10 R&A (mg/L)
gamma-BHC	0.004		0.016						0.0002		
Benzene	0.005		0.312						0.005		
Benzo(a)anthracene											
Benzo(a)pyrene									0.0002		
Benzo(b)fluoranthene											
Benzo(g,h,i)perylene											
Benzo(k)fluoranthene											
bis(2-ethylhexyl)phthalate											
Carbazole											
alpha-Chlordane	0.000021	b, c	0.0000213		0.0024	c	0.0000043	c	0.002	c	
gamma-Chlordane	0.000021	b, c	0.0000213		0.0024	c	0.0000043	c	0.002	c	
Chrysene											
Di-n-butyl phthalate											
Di-n-octyl phthalate											
Dibenz(a,h) anthracene											
Dibenzofuran											
Dieldrin	0.0000012	d	0.0000012		0.0025		0.0000019				
Diethylphthalate											
Endosulfan I					0.00022	d	0.000056	d			
Endosulfan II					0.00022	d	0.000056	d			
Endosulfan sulfate											
Endrin	0.0002				0.00018		0.0000023		0.002		
Endrin aldehyde											
Endrin ketone											
Ethylbenzene									0.7		
Fluoranthene											
Fluorene											
Heptachlor epoxide	0.00108		0.00739						0.0002		
Indeno(1,2,3-cd)pyrene											
Methylene chloride									0.005		
N-Nitrosodiphenylamine											
Naphthalene											
Phenanthrene					0.03		0.03				
Phenol											
Pyrene											

Table A-8
Surface Water Contaminant-Specific ARARs
RSR Corporation Superfund Site OU No. 3

Chemical	1 R&A (mg/L)	2 R&A (mg/L)	3 R&A (mg/L)	4 R&A (mg/L)	9 R&A (mg/L)	10 R&A (mg/L)
Toluene					1	
Trichloroethene	0.005				0.005	
Xylene (total)					10	

Notes:

- ¹Criteria in Water for Specific Toxic Materials--Human Health Protection. Category A--Water and Fish. 30 TAC Section 307.6 Toxic Materials
²Criteria in Water for Specific Toxic Materials--Human Health Protection. Category B--Fresh Water Fish Only. 30 TAC Section 307.6 Toxic Materials
³Criteria in Water for Specific Toxic Materials--Aquatic Life Protection. Fresh Acute Criteria. 30 TAC Section 307.6 Toxic Materials
⁴Criteria in Water for Specific Toxic Materials--Aquatic Life Protection. Fresh Chronic Criteria. 30 TAC Section 307.6
⁵Standards of Chemical Quality, 30 TAC Section 290.103 (Note: Texas Maximum Contaminant Levels)
¹⁰Secondary Constituent Levels, 30 TAC Section 290.113 (Note: Texas Secondary Maximum Contaminant Levels)

TBC = To be considered.

R&A = relevant and appropriate.

a = Indicates that the criteria for a specific parameter are for the dissolved portion in water. All other criteria are for total recoverable concentrations.

b = Calculations are based on USFDA Action Levels for fish tissue concentrations.

c = Value is for chlordane

d = Calculations are based on measured bioconcentration factors, and no lipid content correction factor was applied.

e = Value is for hexavalent chromium.

* Hardness depended criteria based on the following:

Cadmium	$e^{(1.128[\ln(\text{hardness})]-1.6774)}$
Chromium	$e^{(0.8190[\ln(\text{hardness})]+3.688)}$
Copper	$e^{(0.9422[\ln(\text{hardness})]-1.3844)}$
Lead	$e^{(1.273[\ln(\text{hardness})]-1.460)}$
Nickel	$e^{(0.8460[\ln(\text{hardness})]+3.3612)}$
Zinc	$e^{(0.8473[\ln(\text{hardness})]+0.8604)}$

** Hardness dependent criteria based on the following:

Cadmium	$e^{0.7852[\ln(\text{hardness})]-3.490}$
Chromium	$e^{0.8190[\ln(\text{hardness})]+1.561}$
Copper	$e^{0.8545[\ln(\text{hardness})]-1.386}$
Lead	$e^{1.273[\ln(\text{hardness})]-4.705}$
Nickel	$e^{(0.8460[\ln(\text{hardness})]+1.1645)}$
Zinc	$e^{(0.8473[\ln(\text{hardness})]+0.7614)}$

Assumes hardness = 96 mg/L as CaCO₃. Table 2--Basin pH and Total Hardness Values to be Used for Evaluation of Selected Toxic Parameters. 30 TAC Section 307.6 Toxic Materials

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Table A-9
Air ARARs
RSR Corporation Superfund Site OU No. 3

Page 1 of 6

Requirement	ARAR?	Justification
1. Contaminant-Specific		
Federal		
National (Primary and Secondary) Ambient Air Quality Standards (NAAQS) 40 C.F.R. Part 50	Yes	The NAAQS specify the maximum concentration of a federally regulated air pollutant (i.e., SO ₂ , particulate matter (PM ₁₀), NO ₂ , CO, ozone, and lead) in an area resulting from all sources of that pollutant. No new construction or modification of a facility, structure or installation may emit an amount of any criteria pollutant that will interfere with the attainment or maintenance of a NAAQS (<u>see</u> 40 C.F.R. § 51.160). For the federal NAAQS standards, all measurements of air quality are corrected to a reference temperature of 25°C and to a reference pressure of 760mm Hg (1,013.2 millibars). 40 C.F.R. § 50.3.
National Emission Standards for Hazardous Air Pollutants (NESHAPs) 40 C.F.R. Part 61 Subpart A	No	These provisions regulate the emissions of specified "hazardous air pollutants" [listed in 40 C.F.R. § 61.01(a)] that are emitted from particular <u>sources</u> or <u>processes</u> [listed in 40 C.F.R. Part 61].
Fugitive Emissions Source Standards 40 C.F.R. Part 61 Subpart V	No	Regulates specified equipment which are potential sources of fugitive emissions because they contain or contact fluid which is at least 10% by weight a volatile hazardous air pollutant ("VHAP" – including benzene and vinyl chloride). This requirement is not an ARAR as no fluid containing at least 10% by weight of a VHAP is present at the site.
Mercury Standards 40 C.F.R. Part 61 Subpart E	No	These provisions apply to stationary sources that process mercury ore, and incinerate or dry wastewater treatment plant sludge. The requirement is not an ARAR as no processing of mercury ore and/or no incineration of wastewater treatment plant sludge will occur at the site.
State		
Particulates – Net Ground Level 30 TAC § 111.155	Yes	Establishes the net ground level concentration (downwind at the property boundary minus upwind measurements) of particulate emissions from any source that must not be exceeded.
SO ₂ Ground Level Concentration 30 TAC § 112.7	No	SO ₂ emissions from any source must not exceed a net ground level concentration (downwind at property boundary minus upwind). Not in ARAR since no SO ₂ emissions are expected during or after remediation.
Hydrogen Sulfide 30 TAC § 112.31 & § 112.32	No	Sets net ground level concentration limits for hydrogen sulfide. Not an ARAR since no hydrogen sulfide emissions are expected during or after remediation.

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Table A-9
Air ARARs
RSR Corporation Superfund Site OU No. 3

Page 2 of 6

Requirement	ARAR?	Justification
Sulfuric Acid 30 TAC § 112.41	No	Sets net ground level concentration limits for sulfuric acid. Not an ARAR since no sulfuric acid emissions are expected during or after remediation.
Inorganic Fluoride 30 TAC § 113.3(a)(2) and (a)(3)	No	Sets atmospheric and net ground level concentration limits for inorganic fluoride (as HF). Not an ARAR since no HF emissions are expected during or after remediation.
Beryllium 30 TAC § 113.3(b)	No	Sets atmospheric and net ground level concentration limits for beryllium. It is not expected that beryllium emissions will be generated during or after remediation.
Lead Emissions from smelting facilities	No	Rules relate to lead emissions from stationary sources in Dallas County. Sets standards for the control of lead emissions in Dallas County. Not an ARAR because smelter emissions as a result of an operating facility do not exist.
Attainment of Risk Reduction Standard Number 1: Closure/Remediation to Background Subchapter S 30 TAC § 335.554	No	These provisions specify that, to meet Risk Reduction Standard Number 1, closure and/or remediation must meet background levels or practical quantitation limits if the practical quantitation limit exceeds background. These provisions would be relevant and appropriate if Risk Reduction Standard Number 1 were the preferred standard; however, it is unlikely that cleanup goals will be set at background levels.
Attainment of Risk Reduction Standard Number 2: Closure/Remediation to Health-Based Standards and Criteria Subchapter S 30 TAC § 335.555	Yes	Subsection (d) specifies that the concentration of a contaminant in contaminated media of concern such as groundwater, surface water, air or soil shall not exceed the cleanup levels as defined in § 335.556 (relating to Determination of Cleanup Levels for Risk Reduction Standard Number 3). If the practical quantitation limit and/or background concentration is greater than the cleanup level, the greater of the practical quantitation limit or background shall be used for determining compliance with the requirements of this section. These provisions are relevant and appropriate to development of contaminant-specific cleanup goals for OU No. 3.
Determination of Cleanup Levels for Risk Reduction Standard Number 2 Subchapter S 30 TAC § 335.556	Yes	Specifies that for purposes of risk reduction, cleanup levels for individual contaminants are represented by Texas or federal promulgated health-based standards, or when these are not available or do not provide appropriate protection, then cleanup levels based on procedures specified for determining other numeric criteria (medium-specific concentration or MSC) are required to be developed. These provisions are relevant and appropriate to OU No. 3.

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<p style="text-align: center;">Table A-9 Air ARARs RSR Corporation Superfund Site OU No. 3</p> <p style="text-align: right;">Page 3 of 6</p>		
Requirement	ARAR?	Justification
Criteria for Selection of Non-residential Soil Requirements for Risk Reduction Standard Number 2 Subchapter S 30 TAC § 335.557	Yes	Specifies the conditions under which soil requirements can deviate from residential soil requirements. Subsection (1) notes that for property located within the jurisdictional area of a zoning authority, documentation may be provided to demonstrate that the property is zoned for commercial or industrial use. These provisions are relevant and appropriate as they pertain to particulates generated from contaminated soil.
Medium Specific Concentrations for Risk Reduction Standard Number 2 Subchapter S 30 TAC § 335.558	Yes	Subsections (b) through (d) of this section specify the methods for calculating medium specific concentrations for ingestion of surface water and groundwater, and soil ingestion along with inhalation of volatiles and particulates. These provisions are relevant and appropriate to setting contaminant-specific cleanup goals for OU No. 3, and are to be applied after evaluation of the National Ambient Air Quality Standards and NESHAPs, and other applicable federal standards. Texas Air Control Board standards also apply according to these provisions.
Medium Specific Requirements and Adjustments for Risk Reduction Standard Number 2 Subchapter S 30 TAC § 335.559	Yes	Subsections (b) through (h) specify requirements that can define or modify numeric cleanup levels such as media-specific concentrations or require non-health based criteria to be addressed. These provisions are relevant and appropriate to establishing cleanup goals for OU No. 3.

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Table A-9
Air ARARs
RSR Corporation Superfund Site OU No. 3

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Requirement	ARAR?	Justification
2. Action-Specific		
Federal		
Prevention of Significant Deterioration of Air Quality 42 U.S.C. § 7475 40 C.F.R. § 52.21	No	These provisions impose various requirements (e.g. use of best available control technology) on any new major stationary source of a federally regulated air pollutant in an area which has been designated attainment or unclassifiable for that pollutant. A "major stationary source" is a source listed in 40 C.F.R. § 52.21 which emits, or has the potential to emit, 100 tons per year of a federally regulated air pollutant or any non-listed source that emits, or has the potential to emit, 250 tons per year of a federally regulated air pollutant. Activities at OU No. 3 are not expected to constitute a major stationary source of any federally regulated air pollutant. The requirement is not an ARAR.
Nonattainment Areas – LAER 42 U.S.C. § 172(b)(6) and § 173	No	A state's permit program under the federal Clean Air Act must require permits for the construction and operation of new major stationary sources in NAAQS nonattainment areas. Such a permit may be issued only if the proposed source complies with "lowest achievable emission rate" requirements. Not an ARAR since activities at OU No. 3 do not constitute new major stationary sources.
New Source Performance Standard for Incinerators 40 C.F.R. Part 60 Subpart E	No	Sets a limit for particulate emissions of 0.18g/dscm (0.08 gr/dscf) corrected to 12% CO ₂ . Not an ARAR since the rule applies to furnaces burning municipal waste.
Hazardous Waste Incinerators 40 C.F.R. Part 264, Subpart O	No	Not an ARAR since a hazardous waste incinerator is unlikely to be used at OU No. 3.
State		
Control of Air Pollution by Permits for New Construction or Modification 30 TAC § 116	Yes	New non-exempt facilities which may emit air pollutants must obtain a construction permit or special permit. To obtain such a permit, the owner or operator of the proposed facility must provide for measuring emissions of significant air contaminants, and must demonstrate, among other things, that the facility will utilize the "best available control technology, with consideration given to the technical practicability and economic reasonableness of reducing or eliminating the emissions from the facility." Applies during construction activities. May be relevant and appropriate.

Table A-9
Air ARARs
RSR Corporation Superfund Site OU No. 3

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Requirement	ARAR?	Justification
Requirements for Specified Sources 30 TAC § 111.111	Yes	Visible emissions shall not be permitted to exceed an opacity of 30% for any six-minute period from any building, enclosed facility, or other structure. Applies during any activity that may generate visible emissions. Relevant and appropriate for construction activities at OU No. 3.
Storage of Lead Containing Materials 30 TAC § 113.82(a) and (b)	Yes	No unenclosed storage of material containing more than 1% lead by weight. All particulate matter containing more than 1% lead by weight collected by air pollution control equipment shall be stored in closed containers or in a structure under significant negative pressure to prevent emissions to the atmosphere. Applies if lead content exceeds 1% by weight. Applicable to OU No. 3.
Transport of Materials 30 TAC § 113.84(1) and (2)	Yes	All transport vehicles carrying materials containing more than 1% lead by weight must have covered cargo compartments at all times on plant property except during loading and unloading, when being washed, or inside a building. Each time a vehicle leaves a structure, all material containing more than 1% lead by weight shall be removed from the wheels; if water is used, this requirement is suspended during freezing weather. Applies if lead content exceeds 1% by weight. Applicable to OU No. 3.
Control of Fugitive Dust 30 TAC § 113.91(a), (b), (c)	Yes	All plant roads shall be paved; parking areas and storage areas for materials containing more than 1% lead by weight shall be paved. Open unpaved areas must be vegetated or covered with rock or crushed aggregate at least three inches deep. Applies if lead content exceeds 1% by weight. Applicable to OU No. 3.
Additional Measures to Reduce Lead Emissions 30 TAC § 113.92(1)	Yes	If they occur outside buildings, spills of dust containing more than 1% lead by weight shall be dampened and cleaned up immediately. Applies if lead content exceeds 1% by weight. Applicable to OU No. 3.
Post Closure Care and Deed Certification for Risk Reduction Standard Number 2 Subchapter S 30 TAC § 335.560	Yes	These provisions specify that, upon attainment of Risk Reduction Standard Number 2, a deed recordation be placed in the county using information contained in Subsections (1) through (4). This requirement is relevant and appropriate to OU No. 3 in so much that provisions similar to Risk Reduction Standard Number 2 are applied.

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Table A-9
Air ARARs
RSR Corporation Superfund Site OU No. 3

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Requirement	ARAR?	Justification
Attainment of Risk Reduction Standard Number 3: Closure/Remediation with Controls Subchapter S 30 TAC § 335.561	Yes	Under Risk Reduction Standard Number 3, a remedy must be permanent, or if that is not practicable, achieve the highest degree of long-term effectiveness possible; cost-effective; and achieve media cleanup requirements specified in 30 TAC § 335.563. These provisions are relevant and appropriate to OU No. 3.
Remedy Evaluation Factor for Risk Reduction Standard Number 3 Subchapter S 30 TAC § 335.562	Yes	These provisions outline the evaluation criteria when evaluating the relative abilities and effectiveness of potential remedies to achieve the requirements for remedies described in 30 TAC § 335.561. The evaluation criteria are relevant and appropriate for screening technologies and alternatives as part of the FS for OU No. 3.
Media Cleanup Requirements for Risk Reduction Standard Number 3 Subchapter S 30 TAC § 335.563	Yes	This section specifies the requirements for establishing cleanup levels for air, surface water, groundwater, and soil, including use of media-specific adjustments. The requirements of this section are relevant and appropriate to OU No. 3.
Post Closure Care Not Required for Risk Reduction Standard Number 3 Subchapter S 30 TAC § 335.564	Yes	Where it is determined that neither engineering nor institutional control measures are required, no post closure care responsibilities are necessary; however, deed recordation is required in accordance with 30 TAC § 335.566. This requirement is relevant and appropriate if the conditions are met at OU No. 3.
2. Location-Specific		
State		
General Application; Proximity of New Construction to Schools 30 TAC § 116.111	Yes	Requires the Texas Air Control Board to consider, in issuing a permit for construction of a facility, any adverse short-term or long-term side effects that an air contaminant or nuisance odor from the facility may have on the individuals attending an elementary, junior high, or senior high school within 3,000 feet of the facility. Since a school is located within 3,000 feet of Site No. 4 of OU No. 3, the requirements is relevant and appropriate.

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Table A-11
Miscellaneous Location-Specific ARARs
RSR Corporation Superfund Site OU No. 3

Page 1 of 2

Requirement	ARAR??	Justification
1. Location-Specific		
Federal		
National Historic Preservation Act 16 U.S.C. § 470 40 C.F.R. § 6.301(b) 36 C.F.R. Part 800	No	Requires federal agencies to take into account the effect of any federally-assisted undertaking or licensing on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historical Places. There is no such district, site, building, structure, or object in or near the RSR site; therefore, the Act is not an ARAR.
Archeological and Historic Preservation Act 16 U.S.C. § 469 40 C.F.R. § 6.301(c)	Yes	Establishes procedures to provide for preservation of scientific, historical, and archeological data which might be destroyed through alteration of terrain as a result of a federal construction project or a federally licensed activity or program. If scientific, historical, or archaeological artifacts are discovered at the site, work in the area of the site affected by such discovery will be halted pending the completion of any data recovery and preservation activities required pursuant to the Act and its implementing regulations.
Historic Sites, Buildings, and Antiquities Act 15 U.S.C. § 461 <u>et seq.</u> 40 C.F.R. § 6.301(a)	No	Requires federal agencies to consider the existence and location of landmarks on the National Registry of Natural Landmarks to avoid undesirable impacts on such landmarks. There is no such landmark that will be affected by the proposed remedy; therefore, the Act is not an ARAR.
Endangered Species Act 16 U.S.C. § 1531 <u>et seq.</u> 50 C.F.R. Part 402	No	Requires that proposed action minimize impacts on endangered species within critical habitats upon which endangered species depend, including consultation with Department of Interior. No plant or animal endangered species of "critical habitat" will be impacted by the proposed remedy at the site; therefore, the Act is not an ARAR.
Wilderness Act 16 U.S.C. § 1131 <u>et seq.</u> 50 C.F.R. Part 35	No	Requires the administration of federally owned wilderness areas to leave them unimpacted. There is no federally owned wilderness area that will be impacted by the proposed remedy; therefore, the Act is not an ARAR.

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Table A-11
Miscellaneous Location-Specific ARARs
RSR Corporation Superfund Site OU No. 3

Page 2 of 2

Requirement	ARAR??	Justification
Federal (Continued)		
National Wildlife Refuge System 16 U.S.C. §§ 668dd, 668ee 50 C.F.R. Part 27	No	Restricts activities within a National Wildlife Refuge. The proposed remedy will not affect a National Wildlife Refuge; therefore, these provisions are not ARARs.
State		
Antiquities Code of Texas TEX. NAT. RES. COD. ANN., CH. 191	No	Prohibits the taking, altering, damaging, destroying, or excavating of a state archeological landmark without a contract or permit. Unless a state archeological landmark is present at the site, the Code is not an ARAR.

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Appendix B Cost Analysis

Cost Analysis

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Cost Estimation

Included in this appendix are costs associated with each of the alternatives described in this report. Capital, annual O&M, and total project present worth costs are listed in tabular form. Also included is a project summary report for each alternative. This report shows how the total cost for each project is broken down. For example, remedial action capital costs, escalation costs, and contingency expenses are shown in the project summary report. Cost estimates for remedial actions were generated based on past engineering experience with similar Superfund/CERCLA sites and using the Remedial Action Cost Engineering and Requirements (RACER) system.

The total project costs shown in the project summary reports differ slightly from the total project costs shown in the summary of alternatives tables. The total project costs presented in these tables are present worth costs, while those presented in the project summary reports are not. RACER does not conduct present worth analysis. A discount rate of 5 percent was used to convert total project costs calculated by RACER to present worth costs.

RACER was developed by the U.S. Air Force and is a PC-based environmental cost estimating system that will accurately estimate costs for all phases of remediation. RACER uses a patented methodology for estimating costs. RACER cost models are based on generic engineering solutions for environmental projects, technologies, and processes. The generic engineering solutions were derived from historical project information, governmental laboratories, construction management agencies, vendors, contractors, and engineering analysis. Estimations created in RACER can be tailored to reflect specific project conditions and requirements. The tailored design is then translated into specific quantities of work and the quantities are priced using current cost data. The cost database was developed from the Corps of Engineers' Unit Price Book and supplemented and verified by vendor and contractor quotes.

Estimation Procedure

In order to generate an accurate cost estimate, cost models in RACER must be tailored to fit a specific site or alternative. Models are specific remedial action technologies or processes. Capping, monitoring, and extraction wells are examples of typical RACER cost models. Once all of the cost models have been chosen for a particular alternative, the models are then tailored to fit the site's conditions and remedial action schedule. Project costs are then applied for each group of models. All estimates were carefully inspected to ensure that the models chosen were a good representation of each alternative.

Project Costs

After all direct costs associated with a given project have been calculated by RACER, indirect project costs are then determined. Indirect project costs include costs for contractor overhead and profit, contingencies, project management, and escalation. Because these costs apply to the entire project, they only need to be calculated once, unless the direct costs are changed.

Escalation Factors

Escalation factors are taken from the 1995 Inflation Indices Table produced by the Office of Management and Budget. An escalation factor will be calculated for each alternative with a valid start date and duration based on startup/construction and O&M schedule. This escalation factor is used to escalate costs associated with each alternative for the determination of the total project cost after completion. RACER escalates all cost to the midpoint of the startup/construction or O&M schedule. The model assumes that half of the expenditures occur before the midpoint and half take place after the midpoint. Escalation factors are updated annually.

RSR Corporation Superfund Site - Remediation of OU 3 Site 1

Summary of Alternatives (Accuracy Range: +50% / -30%)

Alternative	Description	Capital Costs	Annual O & M Costs	O&M Period (years)	Total Project Costs Present Worth
Alternative 1a	No Action	\$0	\$0	0	\$0
Alternative 1b	Institutional Controls; Monitoring	\$99,040	\$2,580	5	\$110,210
Alternative 2	Removal; Monitoring	\$1,503,490	\$2,580	5	\$1,514,660
Alternative 3	Protective Cap; Removal; Monitoring	\$671,880	\$3,530	30	\$726,140
Alternative 4	Composite Cap; Removal; Monitoring	\$1,161,670	\$3,530	30	\$1,215,930

NOTE: A discount rate of 5% was used for present worth analysis.

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PROJECT SUMMARY REPORT

RSR OU3 SITE1 ALT 1B

Dallas TX
PL
10/05/95

026526

Category	Amount
PA/SI	\$ 0
Studies	0
Remedial Design	0
RA Capital	0
Site Work	31,161
Sampling and Analysis	0
RA Professional Labor	1,478
Subcontractor Overhead & Profit	2,067
General Conditions	21,685
Studies/Professional Labor Overhead	2,324
Prime Contractor Home Office	3,172
Subtotal	\$ 61,887
Prime Contractor	
Profit - (Fee) (8.03%)	4,972
RA Operations and Maintenance	6,278
O&M Service Contract	
Overhead, Tax & Profit	1,770
Subtotal	\$ 74,907
Escalation	5,034
Total Contract Costs	\$ 79,941
Contingencies (30.00%)	23,982
Project Management (10.00%)	7,994
Total Project Costs	\$ 111,917

***** END OF REPORT *****

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PROJECT SUMMARY REPORT

NEW SITE1 ALT 2

Dallas TX
PL
10/05/95

026527

Category	Amount
PA/SI	\$ 0
Studies	0
Remedial Design	0
RA Capital	335,624
Site Work	338,067
Sampling and Analysis	16,548
RA Professional Labor	6,535
Subcontractor Overhead & Profit	40,699
General Conditions	155,105
Studies/Professional Labor Overhead	10,264
Prime Contractor Home Office	42,268
Subtotal	\$ 945,110
Prime Contractor	
Profit - (Fee) (7.32%)	69,237
RA Operations and Maintenance	6,278
O&M Service Contract	
Overhead, Tax & Profit	1,770
Subtotal	\$ 1,022,395
Escalation	60,725
Total Contract Costs	\$ 1,083,120
Contingencies (30.00%)	324,936
Project Management (10.00%)	108,312
Total Project Costs	\$ 1,516,368

***** END OF REPORT *****

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PROJECT SUMMARY REPORT

NEW SITE1 ALT 3

Dallas TX
PL
10/05/95

026528

Category	Amount
PA/SI	\$ 0
Studies	0
Remedial Design	0
RA Capital	230,139
Site Work	38,263
Sampling and Analysis	0
RA Professional Labor	8,919
Subcontractor Overhead & Profit	16,345
General Conditions	93,624
Studies/Professional Labor Overhead	14,007
Prime Contractor Home Office	18,102
Subtotal	\$ 419,399
Prime Contractor	
Profit - (Fee) (7.93%)	33,283
RA Operations and Maintenance	36,278
O&M Service Contract	
Overhead, Tax & Profit	8,580
Subtotal	\$ 497,540
Escalation	57,957
Total Contract Costs	\$ 555,497
Contingencies (30.00%)	166,649
Project Management (10.00%)	55,549
Total Project Costs	\$ 777,695
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***** END OF REPORT *****

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PROJECT SUMMARY REPORT

NEW SITE1 ALT 4

Dallas TX
PL
10/05/95

026529

Category	Amount
PA/SI	\$ 0
Studies	0
Remedial Design	0
RA Capital	451,028
Site Work	38,263
Sampling and Analysis	0
RA Professional Labor	8,919
Subcontractor Overhead & Profit	29,699
General Conditions	151,160
Studies/Professional Labor Overhead	14,007
Prime Contractor Home Office	32,024
Subtotal	\$ 725,100
Prime Contractor	
Profit - (Fee) (7.90%)	57,321
RA Operations and Maintenance	36,278
O&M Service Contract	
Overhead, Tax & Profit	8,580
Subtotal	\$ 827,279
Escalation	78,071
Total Contract Costs	\$ 905,350
Contingencies (30.00%)	271,605
Project Management (10.00%)	90,535
Total Project Costs	\$ 1,267,490

***** END OF REPORT *****

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RSR Corporation Superfund Site - Remediation of OU 3 Site 3

Summary of Alternatives (Accuracy Range: +50% / -30%)

Alternative	Description	Capital Costs	Annual O & M Costs	O&M Period (years)	Total Project Costs Present Worth
Alternative 1a	No Action	\$0	\$0	0	\$0
Alternative 1b	Institutional Controls; Monitoring	\$344,350	\$6,530	5	\$372,620
Alternative 2	Removal; Monitoring	\$1,620,810	\$6,540	5	\$1,649,120
Alternative 3	Protective Cap; Removal; Monitoring	\$1,175,610	\$4,490	30	\$1,244,630
Alternative 4	Composite Cap; Removal; Monitoring	\$24,062,910	\$7,520	30	\$24,178,500

NOTE: A discount rate of 5% was used for present worth analysis.

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PROJECT SUMMARY REPORT

RSR OU3 SITE3 ALT 1B

Dallas TX
PL
10/05/95

026531

Category	Amount
PA/SI	\$ 0
Studies	0
Remedial Design	0
RA Capital	0
Site Work	139,780
Sampling and Analysis	0
RA Professional Labor	1,478
Subcontractor Overhead & Profit	8,481
General Conditions	55,682
Studies/Professional Labor Overhead	0
Prime Contractor Home Office	9,774
Subtotal	\$ 215,195
Prime Contractor	
Profit - (Fee) (7.93%)	17,066
RA Operations and Maintenance	15,929
O&M Service Contract	
Overhead, Tax & Profit	4,462
Subtotal	\$ 252,652
Escalation	16,619
Total Contract Costs	\$ 269,271
Contingencies (30.00%)	80,781
Project Management (10.00%)	26,927
Total Project Costs	\$ 376,979

***** END OF REPORT *****

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PROJECT SUMMARY REPORT

A-NEW SITE3 ALT 2

Dallas TX
PL
10/05/95

026532

Category	Amount
PA/SI	\$ 0
Studies	0
Remedial Design	0
RA Capital	216,858
Site Work	507,320
Sampling and Analysis	24,823
RA Professional Labor	4,746
Subcontractor Overhead & Profit	43,628
General Conditions	167,730
Studies/Professional Labor Overhead	7,455
Prime Contractor Home Office	45,838
Subtotal	\$ 1,018,398
Prime Contractor	
Profit - (Fee) (7.16%)	72,955
RA Operations and Maintenance	15,929
O&M Service Contract	
Overhead, Tax & Profit	4,462
Subtotal	\$ 1,111,744
Escalation	69,345
Total Contract Costs	\$ 1,181,089
Contingencies (30.00%)	354,326
Project Management (10.00%)	118,108
Total Project Costs	\$ 1,653,523

***** END OF REPORT *****

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PROJECT SUMMARY REPORT

NEW SITE3 ALT 3

Dallas TX
PL
10/05/95

026533

Category	Amount
PA/SI	\$ 0
Studies	0
Remedial Design	0
RA Capital	461,810
Site Work	39,496
Sampling and Analysis	0
RA Professional Labor	9,830
Subcontractor Overhead & Profit	30,348
General Conditions	144,881
Studies/Professional Labor Overhead	15,436
Prime Contractor Home Office	32,310
Subtotal	\$ 734,111
Prime Contractor	
Profit - (Fee) (7.86%)	57,732
RA Operations and Maintenance	45,929
O&M Service Contract	
Overhead, Tax & Profit	11,272
Subtotal	\$ 849,044
Escalation	86,833
Total Contract Costs	\$ 935,877
Contingencies (30.00%)	280,763
Project Management (10.00%)	93,587
Total Project Costs	\$ 1,310,227

***** END OF REPORT *****

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PROJECT SUMMARY REPORT

RSR OU3 SITE3 ALT 4

Dallas TX
PL
10/05/95

026534

Category	Amount
PA/SI	\$ 0
Studies	0
Remedial Design	0
RA Capital	11,143,340
Site Work	314,939
Sampling and Analysis	0
RA Professional Labor	113,124
Subcontractor Overhead & Profit	471,909
General Conditions	2,558,327
Studies/Professional Labor Overhead	177,582
Prime Contractor Home Office	560,665
Subtotal	\$ 15,339,886
Prime Contractor	
Profit - (Fee) (4.55%)	698,867
RA Operations and Maintenance	75,929
O&M Service Contract	
Overhead, Tax & Profit	18,082
Subtotal	\$ 16,132,764
Escalation	1,216,254
Total Contract Costs	\$ 17,349,018
Contingencies (30.00%)	5,204,705
Project Management (10.00%)	1,734,901
Total Project Costs	\$ 24,288,624

***** END OF REPORT *****

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RSR Corporation Superfund Site - Remediation of OU 3 Site 4

Summary of Alternatives (Accuracy Range: +50% / -30%)

Alternative	Description	Capital Costs	Annual O & M Costs	O&M Period (years)	Total Project Costs Present Worth
Alternative 1a	No Action	\$0	\$0	0	\$0
Alternative 1b	Institutional Controls; Monitoring	\$311,260	\$4,230	5	\$329,570
Alternative 2	Removal; Monitoring	\$5,958,810	\$4,230	5	\$5,977,120
Alternative 3	Protective Cap; Removal; Monitoring	\$3,528,600	\$3,970	30	\$3,589,630
Alternative 4	Composite Cap; Removal; Monitoring	\$8,273,880	\$5,910	30	\$8,364,730

NOTE: A discount rate of 5% was used for present worth analysis.

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PROJECT SUMMARY REPORT

NEW SITE4 ALT 1B

Dallas TX
pl
05/02/96

026536

Category	Amount
PA/SI	\$ 0
Studies	0
Remedial Design	0
RA Capital	0
Site Work	122,130
Sampling and Analysis	0
RA Professional Labor	1,478
Subcontractor Overhead & Profit	7,555
General Conditions	52,348
Studies/Professional Labor Overhead	2,324
Prime Contractor Home Office	8,725
Subtotal	\$ 194,560
Prime Contractor	
Profit - (Fee) (7.93%)	15,438
RA Operations and Maintenance	10,296
O&M Service Contract	
Overhead, Tax & Profit	2,933
Subtotal	\$ 223,227
Escalation	14,220
Total Contract Costs	\$ 237,447
Contingencies (30.00%)	71,234
Project Management (10.00%)	23,744
Total Project Costs	\$ 332,425
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***** END OF REPORT *****

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PROJECT SUMMARY REPORT

NEW SITE4 ALT 2

Dallas TX
pl
11/02/95

026537

Category	Amount
PA/SI	\$ 0
Studies	0
Remedial Design	0
RA Capital	919,641
Site Work	1,951,287
Sampling and Analysis	82,743
RA Professional Labor	4,746
Subcontractor Overhead & Profit	131,955
General Conditions	549,234
Studies/Professional Labor Overhead	7,455
Prime Contractor Home Office	175,146
Subtotal	\$ 3,822,207
Prime Contractor	
Profit - (Fee) (5.15%)	197,144
RA Operations and Maintenance	10,296
O&M Service Contract	
Overhead, Tax & Profit	2,933
Subtotal	\$ 4,032,580
Escalation	238,836
Total Contract Costs	\$ 4,271,416
Contingencies (30.00%)	1,281,424
Project Management (10.00%)	427,141
Total Project Costs	\$ 5,979,981

***** END OF REPORT *****

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PROJECT SUMMARY REPORT

NEW SITE4 ALT 3

Dallas TX
pl
11/02/95

026538

Category	Amount
PA/SI	\$ 0
Studies	0
Remedial Design	0
RA Capital	1,539,910
Site Work	12,524
Sampling and Analysis	1,685
RA Professional Labor	28,466
Subcontractor Overhead & Profit	82,101
General Conditions	423,484
Studies/Professional Labor Overhead	44,691
Prime Contractor Home Office	98,881
Subtotal	\$ 2,231,742
Prime Contractor	
Profit - (Fee) (5.99%)	133,885
RA Operations and Maintenance	40,296
O&M Service Contract	
Overhead, Tax & Profit	9,743
Subtotal	\$ 2,415,666
Escalation	189,731
Total Contract Costs	\$ 2,605,397
Contingencies (30.00%)	781,619
Project Management (10.00%)	260,539
Total Project Costs	\$ 3,647,555
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***** END OF REPORT *****

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PROJECT SUMMARY REPORT

NEW SITE4 ALT 4

Dallas TX
pl
11/02/95

026539

Category	Amount
PA/SI	\$ 0
Studies	0
Remedial Design	0
RA Capital	3,777,267
Site Work	12,524
Sampling and Analysis	1,685
RA Professional Labor	28,466
Subcontractor Overhead & Profit	173,241
General Conditions	966,556
Studies/Professional Labor Overhead	44,691
Prime Contractor Home Office	237,903
Subtotal	\$ 5,242,333
Prime Contractor	
Profit - (Fee) (5.18%)	271,995
RA Operations and Maintenance	58,835
O&M Service Contract	
Overhead, Tax & Profit	14,979
Subtotal	\$ 5,588,142
Escalation	448,361
Total Contract Costs	\$ 6,036,503
Contingencies (30.00%)	1,810,950
Project Management (10.00%)	603,650
Total Project Costs	\$ 8,451,103

***** END OF REPORT *****

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